Metals Review
THE NEWS DIGEST MAGAZINE
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Metals Review

THE NEWS DIGEST MAGAZINE

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A.S.M. REVIEW OF METAL LITERATURE

SPECIAL FEATURES

IMPORTANT LECTURES

DEPARTMENTS

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Tools of Design

By William H. Browne

Supervisor, Mechanical Engineering Div.
Battelle Memorial Institute

The Design Engineer Has Five Tools to Work With — Design Techniques, Materials, Testing Techniques, Production Procedures and "Quality X". A Review of Recent Literature Indicates How Well He Is Making Use of Them

A REVIEW OF THE literature serves to indicate the technical progress of any branch of engineering. A secondary function is to outline the scope of activity and interest of those practicing in that field. In so doing, it demonstrates rather clearly their dependence on contributions from other fields outside their own.

Probably nowhere is this more apparent than in mechanical design. The designer is essentially a builder, who utilizes the results obtained by other engineering sciences to create useful products. The role of builder requires him to fuse the necessary design techniques with proper engineering materials to produce a sound combination of elements capable of economic use.

To do this, the designer must be familiar with the latest results of invention and research. He must often rely on the experience of specialists, either through personal contact or through the literature. The position of the specialist as a contributor to design is quite understandable. *Machine Design* (Sept. 1929) described this relationship by defining machine design as "the clearing house where the fruits of discovery, invention and research meet the experience of applied mechanics".

In attempting to produce an adequate design, the engineer may fail in his responsibility by neglecting economics. It has been demonstrated that proper functioning of a design is not sufficient; consumer demand is based on cost as well as performance. A vigorous sales campaign can often create buyer demand but only technical soundness coupled with an acceptable price can maintain that demand for any period of time. To achieve an acceptable price, design and production must be coordinated. The designer must therefore understand production procedures and take advantage of the economies offered (24A-8, March 1949).*

Basically, the designer's tools consist of design techniques, materials, testing techniques, production procedures, and Quality X. Of these, only the last must be supplied by the designer. For the others he can call upon the literature.

*Literature references are cited by the corresponding item number in the Review of Current Metal Literature instead of repeating the entire title, author, and source; this information can be obtained by referring to *Metals Review* for the month indicated in 1949, or the 1948 bound volume of the A.S.M. Review of Metal Literature (Volume 5).

Design Technique

Distribution of stress in structural components is the basic consideration in design techniques. (In this connection, *Applied Mechanics Review*, published by the American Society of Mechanical Engineers, presents to the designer comprehensive abstracts of important papers in the field of applied mechanics.)

Added impetus to investigations is being given by the newly organized Society for Experimental Stress Analysis, which combines the interests of mathematician, stress analyst, and research engineer.

In a treatment of the stress distribution around a hole near the edge of a plate (24a-148, 1948), stress-concentration factors as high as ten are noted. In this two-dimensional problem in a semi-infinite plate with tension applied parallel to the edge, the stress along the boundary near the minimum section rapidly increases to a sharp peak. Expressions for the stress along the rim of overlapping holes (24a-118, 1948) and the maximum stress in a plate were developed through an even integral solution of a biharmonic equation expressed in bipolar coordinates. The secant modulus method previously used for determining the critical compressive stress above the proportional limit (24a-187, 1948) was extended for the critical shear stress. The validity of the method was established by experiment.

True stress diagrams at low temperatures (24B-20, June 1949) were determined for a number of steels. The usual tensile test specimens were used with a special vessel of tubular shape to maintain the desired atmospheric temperature. Although by no means fully reported, a large amount of work has been done on the properties of materials at low temperatures. The results are seen in markedly changing design techniques.

The replacement of dynamic loads by static loads (24A-27, April 1949) was investigated by a method involving equality of deflection. The treatment is graphical and results only in an approximation. The method includes means of estimating the peak deflection and the time required to reach this peak.

The usual method of obtaining the allowable stress of a material is to group numerous factors together as a factor of safety. A different approach to the problem is to evaluate quantitatively the effect of each factor as reflecting the particular part and its working conditions (24B-18 and 24B-22, May and June 1949). Thus, loading, surface finish, surface treatment, and life expectancy can be treated separately to obtain a more accurate design factor which will permit greater efficiency from the standpoint of material usage.

The importance of efficient use of material is also demonstrated by a "structural index" (24A-48, April 1949). Use of the index to determine the lightest practical arrangement of material to transmit the required loads through the specified distances is shown by numerous examples, including tubular columns, stiffened flat plates, and shells.

The necessity for lightening the weight of equipment often leads the designer to the light metals. In using these alloys, a plea has been raised for a complete break with traditional design (24d-24, 1948). Instead of direct substitution of materials, design innovations would lead to a more complete realization of the possibilities offered by the light alloys.

The use of statistical methods in the assignment of tolerances can effect large production economies (24A-36, April 1949). Shewhart charts are used to estimate the natural tolerances of the machine tools. Statistical procedures are then followed to assign tolerances to component parts as they are detailed in the drafting room.

The basic formulas for the design of tension and compression springs have long been applied by the trial-and-error method. Based on the use of a load constant, a new approach to spring design has been presented (24A-68, June 1949). In addition to simplifying the design procedure, the new technique provides the designer with preliminary space requirements. This is extremely important from the standpoint of the spring manufacturer (24a-178, 1948) because one of the most common errors in spring design is the use of an excessive stress dictated by space limitations. The

designer should also be familiar with spring manufacture (24b-78, 1948) and the variables which affect the manufacturing tolerances (24A-24, April 1949). These variables include free length, wire diameter, coil diameter, active coils, and torsional modulus. Presetting performed by compressing and releasing the spring a few times to prevent permanent set when in use will increase the load limit of the spring by as much as 30% (24A-64, May 1949).

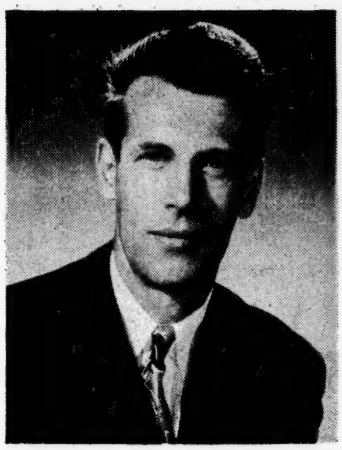
When the designer requires constant loading of a machine element which moves, dead weights are often used. If springs must be applied, intricate cam or lever systems are devised or long springs are specified. Recently, the Neg'ator has been introduced. With this spring, flat or decreasing force-deflection characteristics can be obtained. The Neg'ator is a tight coil of flat material which is progressively unwound through its range of action. This causes each increment of length to be used sequentially. The desired spring rate is obtained by prestressing the length increments differently. This new elastic member will undoubtedly find wide application.

The design and application of torsion bar springs (24a-202 and 24a-216, 1948) has been reconsidered. Basic formulas for stress distribution, energy storage, spring rates, and load capacity are outlined in addition to information on materials and heat treatment. The calculations required in the design of leaf springs (24a-161, 1948) have been reviewed, and a simplified evaluation of the line integrals involved in the leaf-spring deflection is presented.

In bearing design, improved life and performance can be obtained through elastic matching of the machine components which carry the bearing (24a-129, 1948). Proper selection of the elastic properties of these components insures that the line of action of the bearing load always lies in the center of the bearing. The bearing is supported eccentrically, and the deflections of the two members adjacent to it are matched. Full contact along the bearing is obtained.

A novel type of bearing (24A-1, Feb. 1949) was designed to eliminate vibration by having the shaft rotate about its axis of inertia. With the lubricant pressurized by an independent pump, the shaft can be positioned without contact with the bearing, even though not rotated. Thus the entire bearing load is carried by fluid pressure.

Accurate radial cams can be produced in the machine shop even though special cam-machining equipment is lacking (24a-127, 1948). Milling machines and indexing heads can serve the purpose by applying formulas derived from the general analytical properties of the various component curves. Numerous types of profiles such as the straight-line, parabolic, elliptical, and cube base curves can be handled by the methods described.



William H. Browne directs Battelle Institute's research in such fields as product and process development and machine design. He is a graduate of Rensselaer, and was with Caterpillar Tractor Co. for six years until 1942.

On the basis of experiments on 3½-in. threaded rods (24b-87, 1948), it has been shown that with such large bolts the effect of Poisson's ratio may be great enough to contract the cross-sectional area an amount sufficient to overload the section and cause failure of the bolt in the region of the threads. Photoelastic investigations of stresses in bolts (24A-71, June 1949) show that the stress concentration can be reduced markedly by modification of the contour between the bolt head and bolt body. Numerous stress patterns are shown to illustrate this conclusion. As a corollary to this work, the application of well-known principles can increase bolt life appreciably under shock loading (24A-9, March 1949). It is apparently not necessary to search for obscure techniques when designing bolts for impact.

In a theoretical consideration of the stresses that cause failure of gear teeth (24A-2, Feb. 1949), methods of calculating permissible load are presented. The permissible load is a line load between contacting cylindrical surfaces and is treated for static or cyclic conditions and the probable effects of friction.

A notable advance was the international agreement on a unified screw thread (12-151, Sept. 1949). This standardization marks the culmination of efforts which were started in 1918 to permit interchangeability of American and British threaded parts. The standard provides for a 60° angle and a rounded route for the thread. The crest of the thread may be flat or rounded as preferred. The number of threads per inch for the various series of thread diameters and the limiting dimensions for fit were also agreed upon.

No discussion of recent advances in machine components is complete without reference to magnetic fluid, developed by the Bureau of Standards (23A-27, Oct. 1949). The unique property of this fluid is that its viscosity is externally controllable by means of a magnetic field. The fluid was first applied to an electromagnetic clutch. Operation of the clutch demonstrated its ease of control, negligible wear rate, and smoothness of operation. Numerous applications of the fluid are, no doubt, being considered by design engineers.

Materials

Although the designer is always interested in new engineering materials, he is equally concerned with old materials from the standpoint of application efficiency. Technical papers concerning materials usually and rightfully stress physical and chemical properties. Occasionally, however, discussions of design and production techniques are presented. These are of especial interest here.

The application of aluminum alloy castings has been increasing steadily with the demand for lighter products. Composition and heat treatment, casting process, and basic design of the casting must be carefully considered (24d-23, 1948). Aluminum castings offer appreciable ranges of tensile strength, hardness, endurance limit, and shear strength. The alloys can be sand cast, cast in permanent or semipermanent molds, or die cast. Each process requires special attention to obtain its full advantages.

The purpose of a recent publication on alloyed irons and steel (24B-25, June 1949) is to give the inexperienced machine designer some training in the selection of materials. The data are presented in the form of questions and answers covering practical design in its relation to selection of materials.

Products made from nonferrous powdered metals offer certain specific advantages (24c-13, 1948). Some parts are less costly; others are more accurate. Improved electrical characteristics can sometimes be obtained and lubricants can be incorporated in the material.

Testing Techniques

Realizing that unknown imperfections or "bugs" exist in the most carefully designed machine, the designer continually relies on testing procedures to dictate necessary design changes. Often the designer is also the development engineer and is called upon to conduct the performance tests and carry the product through the development stages. He is, therefore, much interested in the latest testing techniques and instruments for the laboratory.

Given an element in which neither the magnitude nor the direction of the main stress is known, residual stresses can be determined by a method based on the measurement of creep, and a stress calculation based on the measurement (24a-196, 1948). Creep is caused by loss of equilibrium between residual stresses when small holes are drilled in the element.

X-ray techniques are old standbys for determining subsurface phenomena in metals. Apparatus assembled at the Bureau of Standards (24a-241, 1948) has been set up to correlate the progress of fatigue damage with surface-strain measurements.

Isostatic and isoentatic patterns in brittle coating have been considered for different combinations of stresses (24a-162, 24a-181, 1948) in an attempt to raise the level of accuracy of stress determinations. Refrigeration technique is used to obtain isostatics in zones where the strain is smaller than that to which the coating is sensitive. Methods and formulas are developed, and an example illustrates their application. In using brittle coating, it should be realized that the stress distribution sometimes changes with different loads and that all properties of the coating are not known.

The method of preparing transparent models for photo-elastic study has been detailed (24a-210, 1948). Their use is illustrated and the significance of the photo-elastic hinges discussed. Problems of three-dimensional stress can be solved by photo-elasticity through frozen-stress technique (24a-209, 1948). The method makes use of the photo-elastic properties of some thermosetting resins. These resins possess considerable residual thermoplasticity.

Models are often used by the engineer to investigate machinery in the design phase. Although extreme care must be exercised in scaling a full-size machine, the correct application of models saves much time and money in machine development. An example of this is the recent development of bolted brass spring models for studying continuous bridge trusses (24A-28, April 1949). Influence lines for pier reactions, truss deflections, and jacking forces can be determined with these models.

Wear is a factor which has received much experimental attention, particularly in internal combustion engines (whose many moving parts present wear problems) and in the field of railroad equipment. A recommendation has recently been made for more attention to this factor in other fields (24a-139, 1948).

Production Procedures

With the increasing use of welded constructions, problems involved—particularly in the design necessary to take advantage of this production tool—are becoming better understood.

In one treatment of the problem (24a-218, 1948), it is stated that "one of the greatest errors in welded products is the fact that too many designers are prone to make the new design look like the object it is replacing". Such a direct substitution of structural components does not take advantage of all that is offered by welding. In taking advantage of the versatility of welding and its greatest claim for use—cost reduction—the designer must be careful that he does not eliminate consideration of such items as forgings and castings.

The cost reductions effected by welding are sometimes defeated by the need for stress relieving the welded structure. Frequently, the structure is so large as to require special or expensive heat treating equipment. A series of tests was conducted to determine the effect on the endurance limit of strained and unstrained welding (24b-85, 1948). Specimens were prepared with longitudinal weld beads along their center lines. Some specimens were stress relieved while others were tested in the as-welded condition. From the laboratory tests, it was concluded that residual welding stresses decrease to some extent the static fracture strength of the material but that under certain conditions in weld structures, residual stresses do not decrease the fatigue strength.

The effect of residual stresses (24B-26, June 1949) was also considered experimentally, using welded test plates with reproducible effects such as notches. These plates were tested in the as-welded state and with low-temperature stress relieving and furnace stress relieving. The results of the bending tests indicated that either type of stress relieving should give considerable assurance against premature failure in practice.

In a book on design for welding (24A-20, March 1949) Koenigsberger compares welded construction with other processes from the standpoint of cost and functional design. The mechanical properties, weldability, and shapes and sections of steel are treated in detail. The properties of the material also influence the shape of a structure where strength and stiffness are the primary requirements.

Welding lends itself admirably to fabrication of farm machinery (24b-102, 1948)—an application amply justified by the proven success of welding in earth-moving equipment. A necessary corollary, of course, is availability to the farmer of maintenance equipment. At present, farm equipment is still largely assembled by bolts and rivets. With corrosion an ever-present condition in farming, these fastener elements complicate the problem of maintenance. Much of the demand for reconsideration of the design of farm equipment has come from the farmer himself, and this demand is beginning to affect the attitude of the equipment manufacturer.

Die casting—an increasingly important production tool—is not always planned for minimum cost. An analysis of die-casting cost (24c-17, 1948) shows that factors such as die cost, raw material, rate of casting, trimming of flash, machining, and die maintenance must be considered. The size and complexity of the part, the mechanical strength required, the type of machine used, the surface finish, and dimensional tolerances are major factors contributing to casting cost.

Impact extrusions, like die castings, require design with production knowledge (24a-201, 1948). The cost of impact extrusions can be held down by following a series of general guides. The size and weight of the part should be at a minimum; only circular cross sections perpendicular to the punch axis should be used; bottom bosses, if required, should be arranged symmetrically; corners should be well rounded; and ample tolerances should be allowed.

Design aspects of production procedures have been thoroughly treated by R. W. Bolz in a series of comprehensive articles in *Machine Design* started in July 1945. With the September 1949 issue (24A-122, Oct. 1949) 46 articles have been published covering such procedures as sand casting, centrifugal casting, welding, machining, grinding, and cold drawing. These articles form excellent basic material for the designer who wants to become better acquainted with production.

Quality X

There are no technical papers presenting the results of laboratory investigations of Quality X; it has never been reduced to a mathematical formula. It does exist, however, because the difference between good and mediocre designers cannot always be explained by the efficiency with which the other design tools are used. Some writers have called it "imagineering", the activity of an inquiring mind or dissatisfaction with the status quo. Whatever it really is, Quality X undoubtedly lies within the designer.

Some products of the designer's board are far from simple, are not pleasing to the eye, are overdesigned in an attempt to obtain greater perfection where it is not needed, or are merely a reproduction of the competitive product with different exterior. These may very well be the results of mediocre design which denotes the absence of Quality X in the designer. It has been suggested that a measure of Quality X lies in the extent of application of a new principle. For example, the magnetic fluid, or fluid with controllable viscosity, developed at the Bureau of Standards will undoubtedly find its way into many future products. Its application can well be a measure of Quality X.

NOTES AND NAMES . . .

at the Metal Congress

IMPRESSIONS received at the 1949 Metal Show in Cleveland were both startling and vivid. They were also multiplied in number on a scale that set records for the annual event. More people saw this expansive demonstration of science and industry together than have ever before witnessed an enclosed industrial exposition. Exhibitor's booths actually occupied 220,000 sq.ft. of floor space. Another 30,000 sq.ft. was beneath the tired feet of those who walked an estimated total of 200,000 miles up and down the aisles of Cleveland's Public Auditorium and its five acres above and below ground. . . .

The little watch-size counters in the hands of four uniformed gate attendants clicked 68,606 times to record the largest total attendance in the history of the Metal Show's 31 years. There were actually many more than that. Students and women were not clocked through the entrance. . . .

Cleveland Convention Bureau's ED BRENNAN reports that the National Metal Congress is the first industrial show or large meeting in the past two years to show an increase rather than a decline in attendance—a hopeful sign of an upward business trend.

From PAUL HURD, manager of the Public Auditorium, comes the surprising fact that the Metal Show sprawled over more area in the hall than had ever before been utilized at one time for exposition purposes.

The most important classification of Metal Show visitors consisted of the metals engineers, technical experts, researchers and production officials who came to inform and be informed on the technological and operating advancements in the metal-working field. Here, also, records were shattered; 37,797 men in this engineering and production category registered and attended the show. This number contrasted with 34,236 who registered in at the Philadelphia Metal Show in 1948. . . .

A.W.S.'s efficient secretary, JOE MAGRATH, also reports a record-breaking registration of over 1800 Welding Society members. Similarly, the other sponsoring societies, the Institute of Metals Division of the A.I.M.E. and the Society for Non-Destructive Testing, had unusually heavy registrations and well-attended meetings.

Opening technical event of the Congress week, despite its forbidding title of "Thermodynamics in Physical Metallurgy", was not designed to frighten people away even before the Show opened. Nor did it, if S.R.O. crowds of 500 to 600 at each of the five sessions mean anything. . . .

Gratifying was MARY BAEYERTZ'S comment that A.S.M. had come of age with the adoption of these seminar meetings three years ago, and can hold up its head with the most erudite of learned societies. Something for every member is still the Society's aim, however, and at the more practical and less theoretical place in the scale were the round-table meetings on Economy-in-Production, where down-to-earth problems in shop and manufacturing plant were batted about.

Dr. BAEYERTZ, by the way, probably holds the record for A.S.M. commuters; she lives in Whittier, Calif., and holds down a job as senior metallurgist for Armour Research Foundation in Chicago.

First impression of the Economy-in-Production meetings was the large number of notebooks and busy pencils in evidence as the panel of experts argued the merits of various cleaning and finishing processes on Monday afternoon. . . .

Compliments should go to three audience participants in these Economy-in-Production meetings who had sufficient courage to come to the platform and join the panel of experts. JOHN QUINCY ADAMS, G.E.'s Carboloy (pardon us—tungsten carbide) expert, contributed some information on measurement of edge-burrs to the discussion of improved press shop operations. In the heat treating session RUSS LAUDERDALE of Northern Ordnance Co. described the induction hardening of roller paths for gun mounts with an inside diameter of 12 ft. How a combination brazing and heat treating operation is performed in a carburizing atmosphere was explained at the brazing, soldering and welding discussion by F. H. PENNELL of DeLaval Steam Turbine Co. (past chairman, Philadelphia Chapter).

So excellent were the entries in the A.S.M. Metallographic Exhibit that the Judging Committee (who for reasons of personal safety prefer to remain anonymous) had no little difficulty selecting the prizewinners. For names of prizewinners, see this issue, page 9. . . .

N.A.C.A.'s ROGER LONG, a former prizewinner who had no entry in the exhibit for the first time in four years, says, however, that he is working on a new technique for making movies of structural transformations which he hopes to have ready for next year.

"Is this book any good?" inquired one of two gentlemen, picking up CARL ZAPFFE'S "Stainless Steels" at the A.S.M. booth. Replied the loyal staff member behind the counter: "If Zapffe wrote it, it must be good", and then blushed becomingly when the second gentleman turned back his coat lapel and revealed the name card —CARL ZAPFFE!

The week's largest crowds again proved A.S.M.'s firm foundation in the field of heat treating—dating back to the days when the group was known as the "Steel Treaters". The Tuesday morning technical session on quench cracking overflowed a good-sized meeting room with almost as many standees as the Campbell Lecture,* while "Transformation and Temper Brittleness" on Wednesday afternoon likewise lured a goodly number to the Auditorium's spacious and comfortable Music Hall. . . .

A contributing factor may have been the presence on both programs of Howe Medalists—namely, M.I.T.'s AVERBACH and COHEN (co-sharers of the medal this year with STEWART FLETCHER), and O.S.U.'s JOE SPRETNAK of the notable "gun tube" team whose continuing research at Carnegie Tech has been fruitful of so much fundamental advancement.

The Tuesday evening panel on heat treating was enlivened by a platform-to-audience interchange of football bets on the Minnesota-Michigan rivalry, ROBERT LUNDQUIST of Minneapolis-Moline Co. (past chairman, Northwest Chapter A.S.M.) on the platform accepting a challenge from A.S.M. Past President A. H. D'ARCAMBAL (Pratt & Whitney), a Michigander from way back. . . .

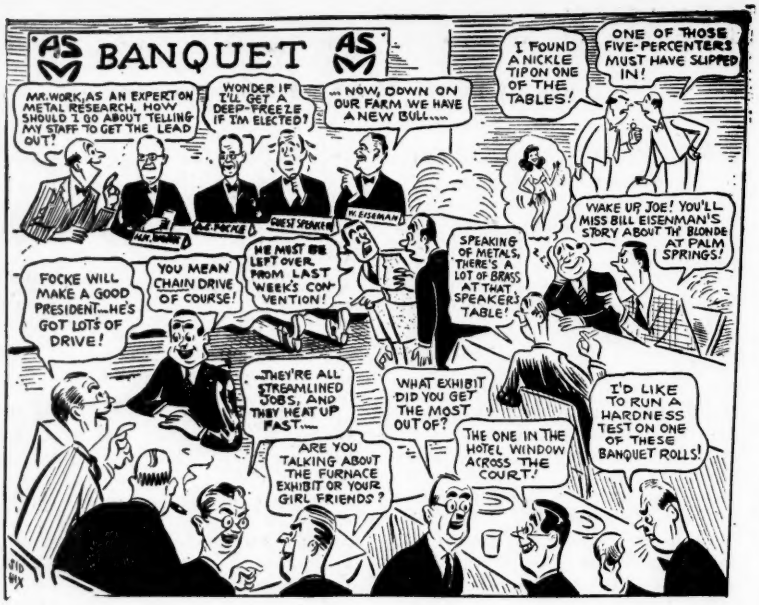
Speaking of past presidents, BILL COLEMAN (W. B. Coleman Co., Philadelphia) showed up looking fit as a fiddle after a summer's recuperation at Estes Park, Colo. . . .

Past President JAMES P. GILL missed his first convention in 30 years—the boat bringing him back from Europe didn't dock until the end of the week. . . .

Absent also was Past President GEORGE WATERHOUSE, who was home taking shots preparatory to flying to Manila on an investigation commission for the Philippine Government.

(Continued on next page)

*It is estimated that some 400 latecomers had to stand in the aisles and corridors to hear EDGAR DIX present his Campbell Lecture on the development of the aluminum-zinc-magnesium alloys.



Sid Hix's Convention Cartoon, Drawn for Lindberg Engineering Co. and Loaned by L. A. Shea, Secretary-Treasurer of the Chicago Chapter A.S.M.

Free Listings Available in New Sales Agent Directory

The good salesman today is in great demand. Many manufacturers are building strong sales organizations on a national basis based on sales representatives or manufacturers' agents in every industrial area. In an effort to assist these manufacturers as well as the sales members of A.S.M., a Manufacturers' Agents Directory will be published.

Sales representatives or manufacturers' agents will be listed in this directory at no charge. Copies of the directory will then be made available to manufacturers.

To be listed simply send your name, the name of your organization, office address and phone number, as well as the number of men in your organization. You must also supply a list of the firms you represent and the territory covered by your men.

Write today for your copy of Manufacturers' Agent form to fill out. Address Manufacturers' Agent Directory, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

The annual Chapter Chairmen's Breakfast on Wednesday morning featured three papers on the general subject of educational and vocational activities. Speakers were L. P. TARASOV, past chairman, Worcester Chapter; F. M. KLAYER, chairman, Louisville Chapter; and ALFRED BORNEMANN, chairman of the Wyzalek Memorial Award Committee, New Jersey Chapter.

Some 40 of the Society's 79 chapters were represented, ranging from as close as Cleveland (CARL HARVEY, chairman) to as distant as Los Angeles (JAMES B. MOREY, chairman) and San Diego (LESTON B. STARK, vice-chairman). . . .

Having this year's Metal Congress in Cleveland was a tough break for ten-year Secretary L. A. ZEITZ. All his expenses were paid for the week at the Congress—but he represents the Canton-Massillon Chapter, almost on Cleveland's doorstep. Luckier was Golden Gate's ten-year secretary, HAROLD KRAYENBUHL, who rated an all-expense trip from California.

The A.S.M. banquet was almost a Carnegie-Illinois homecoming triumph. Carnegie's Vice-President BAIN received the Gold Medal, Research Director GROSSMANN the Sauveur Award, and President COX delivered the principal address. . . .

Shortly after the banquet A.S.M. Secretary BILL EISENMAN received a letter from CHARLES N. COX, sales manager of D. A. Stuart Oil Co., thanking him for the basket of fruit delivered to his room at the Statler with the compliments of the Society. Secretary Eisenman is thinking that the thanks should be transmitted to Banquet Speaker CHARLES R. COX, who had to get along without fruit.

The 18 Alumni Luncheons held on Wednesday noon assembled some 625 old grads for pleasant reunions. ARTHUR FOCKE, a past chairman and vigorous supporter of the O.S.U. Metalumni Group, and fresh from the A.S.M. annual meeting where he was installed as national president, was honored by a capacity crowd of Ohio-Staters. Columbia University was a newcomer among the Metal Congress reunions, but Alumnus A. M. HALL of Battelle reports that a small but enthusiastic group plans to make it an annual affair. . . .

While men were busy with their various affairs, the ladies were kept happy with a full program of entertainment arranged by a committee representing the various cooperating societies under the able chairmanship of ESTELLE VAN HORN, wife of Past President KENT.

Our own CHESTER WELLS, who doubles for BILL EISENMAN on the Exposition floor (or floors) says that 362 exhibits were delivered and erected this year with unusual speed and freedom from trouble. Prime reason for this was the smooth cooperation between the freight handlers, decorators, the A.S.M.'s floor representatives, and the Public Hall's management and operating staff. . . .

Udylite's vice-president and sales manager, L. V. NAGLE, should be scouted by Hollywood executives. His stunning arrangement of gleaming, towerlike equipment merged into the spacious high-ceilinged auditorium as though the two were soulmates. . . .

MILT GARVIN, Cincinnati Milling Machine Co.'s hard-working manager of the Flamatic Division, sold three of these cost-cutting, fast-working selective hardening machines the first day of the Exposition. . . .

Lucky winner of the drawing for the G. E. television set was BOB WHEELER, International Nickel's publicity manager.

The New York *Times* lived up to its slogan of "All the news that's fit to print" by sending a special correspondent to the Congress with the result that daily stories appeared, adding up to six full columns by the end of the week. The *Wall Street Journal* likewise printed daily stories, while seven radio programs and five television appearances combined to give this important event nationwide publicity. . . .

All in all, the Cleveland Metal Show was by far the largest, most impressive and beneficial of the 31 held so far. The enthusiasm of both the exhibitors and the visitors was the soluble ingredient of optimism and confidence over the future of the entire metal industry.

P.S. The 32nd National Metal Congress and Exposition will be held in Chicago in 1950, Monday through Friday, Oct. 23 through 27 (preceded by the Seminar on Saturday and Sunday, Oct. 21 and 22). Mark the dates on your calendar now!

AWARD WINNERS IN FOURTH A.S.M. METALLOGRAPHIC EXHIBIT

National Metal Congress and Exposition, Cleveland, Oct. 17 through 21, 1949

Best in Show
Grand Prize of $100

D. H. Rowland
Research Laboratory
Carnegie-Illinois Steel Corp.

Cast Irons and Cast Steels

First Place: G. K. Manning, Battelle Memorial Institute.

Honorable Mentions: Cornelius A. Johnson, Metals Division, Armour Research Foundation, Illinois Institute of Technology; British Cast Iron Research Association, Birmingham, England.

Toolsteels (Except Carbides)

First Place: R. J. Gray, Oak Ridge National Laboratory.

Honorable Mention: P. Leckie-Ewing, metallurgist, Butterfield Division, Union Twist Drill Co.

Irons and Alloy Steels in Wrought Condition

First Place: R. Dawson, metallurgical assistant, Raleigh Industries, Ltd., Nottingham, England.

Honorable Mention: Oliver E. Olsen, research laboratories, National Lead Co.

Stainless and Heat Resisting Steels and Alloys

First Place: Willard A. Scranton, research division, Thompson Products, Inc.

Light Metals and Alloys

First Place: H. P. Roth, Massachusetts Institute of Technology.

Heavy Nonferrous Metals and Alloys

First Place: H. P. Roth, Massachusetts Institute of Technology.

Honorable Mentions: Axel Bernstein and Bengt Soderlund, Sandvik Steel Works, Sandviken, Sweden; Cornelius A. Johnson, Metals Division, Armour Research Foundation, Illinois Institute of Technology.

Powder Metals (and Carbides) and Compacts

First Place: Laurence Delisle, metallurgist, Sylvania Electric Products, Inc.

Honorable Mention: Willard A. Scranton, research division, Thompson Products, Inc.

Weld Structures (Including Brazed Joints)

First Place: G. W. Mitchell, P. R. Mallory & Co., Inc.

Series Showing Transitions or Changes During Processing

First Place: D. H. Rowland, research laboratory, Carnegie-Illinois Steel Corp.

Honorable Mention: J. K. Stanley and R. L. Anderson, research laboratories, Westinghouse Electric Co.

Surface Phenomena

First Place: D. H. Rowland, research laboratory, Carnegie-Illinois Steel Corp.

Macrographs (2 to 10 Diam.)

First Place: Bror Rossander and Bengt Soderlund, Sandvik Steel Works, Sandviken, Sweden.

Honorable Mention: L. A. Carlson, assistant mechanical engineer, Wood Conversion Co.

Nonoptical or Other Unconventional Techniques

First Place: W. D. Forgeng, Union Carbide and Carbon Research Laboratories, Inc., and A. C. Jenkins, research laboratories, Linde Air Products Co.

Honorable Mentions: Peter Acomb, York, England; Hildreth Griffin, Sperry Gyroscope Co., Inc.; Don M. McCutcheon, applied physics research, Ford Motor Co.

The Reviewing Stand

IT GOES ALMOST without saying that the members of the American Society for Metals are all familiar with the new edition of the Metals Handbook and are taking great pride and pleasure in using it. How the Metals Handbook is being received abroad may be inferred from the following British book review. The review was written by F. C. Thompson and published in the September 1949 issue of the topnotch British monthly, *Metallurgia*.

"This latest edition of the well-known 'Metals Handbook' is a remarkable achievement. In 1268 pages of text, the compilers have managed to include the serious treatment of practically every branch of normal metallurgy. Despite the field covered, there is nothing superficial about the presentation, a fact vouched for by the names of those responsible. Moore deals with fatigue tests; Mehl with recrystallization; Mathewson with the plastic deformation of iron—to mention only a few. Many of the articles have been prepared by *ad hoc* committees who have clearly taken their duties most seriously.

"To give a general idea of the scope of the treatments, one may cite the most interesting discussion of the basic causes of service failures in metals. It extends to some ten pages, is well illustrated, and 99 references to original papers are included in the bibliography. The discussion of pyrometry extends to about 14 pages, and includes the use of photo-electric devices. As a typical page contains some 1900 words, it will be evident that the contributions are really 'meaty'.

"After 19 pages of definitions—very well done on the whole, though there are inevitably some with which any reader may disagree—follow 12 of physical tables. Does the reader need the coefficient of expansion of beryllium-copper, it is there; the densities of sintered carbides, they are there; the thermal conductivity of mullite, it is there; the vapor pressure of strontium, it is there; or the preferred orientation of drawn aluminum, it is there, too.

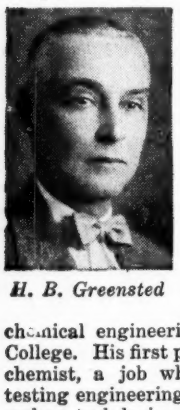
"To give some idea of the width of the field covered, may be mentioned an article of about 10,000 words on statistical methods as a guide in the control of operations and the quality of a product, one of 30,000 words on nondestructive testing, and one of 20,000 on salt and lead baths. Ferrous and nonferrous metals and alloys; refractory materials and fuels; chemical, physical and mechanical properties, all are considered.

"What more can any reviewer say than that there is here a unique volume, essential to all concerned with metals or their uses and, in view of both quantity and quality of the contents, probably the cheapest book on metallurgy ever produced."

F. C. THOMPSON

Greensted Dies, Was Alloy Steel Pioneer

Henry B. Greensted, 68, metallurgical consultant with Algoma Steel Corp., Ltd., Sault Ste. Marie, Canada, died on Sept. 1 after a long illness.



H. B. Greensted

Mr. Greensted had been with Algoma since 1911, when he came to Canada with a background of experience at Youngstown Sheet and Tube Co. and Republic Steel Corp., and with a degree in chemical engineering from Lafayette College. His first position was as chief chemist, a job which expanded into testing engineering and inspection and and control during World War I.

At the end of the war Algoma Steel became a Canadian pioneer in the production of alloy steel, and in recognition of Mr. Greensted's research into alloy steel development during those years he was the recipient of a Distinguished Service Award from the American Society for Metals last year.

In 1935 he was appointed chief metallurgist for the company, a position he held until forced into semi-retirement by an injury in 1947.

Fred L. Wolf

Fred L. Wolf, formerly vice-president of Ross-Tacony Crucible Co., Philadelphia, died on Sept. 27 at the age of 64.

For many years Mr. Wolf was technical superintendent of the Ohio Brass Co. During the war he served as chief of the Mica, Graphite and Rare Minerals Division of the War Production Board. After the war he accepted appointment as a member of a committee named by the Technical Industrial Information Committee to report on nonferrous foundries, ingot producers and pearlitic malleable producers in Germany. He contracted a cold while there, returning home with a severe bronchial cough. This was subsequently diagnosed as resulting from tuberculosis of the lungs, from which he did not recover.

J. B. Sutton

John Blair Sutton, 67, president of the Sutton Engineering Co., Bellefonte, Pa., died on Sept. 25. He had been the company's president and chairman of the board since its formation in 1918. For a number of years previously, he had been associated with the Crucible Steel Co. of America.

William G. Conant

William G. Conant, 47, head of the metallurgical development section of the Schenectady Works Laboratory of the General Electric Co., died on Aug. 27. Mr. Conant was a pioneer in the use of the X-ray for industrial purposes. He was recognized as an authority on high-temperature alloy steels and was the author of a number of technical articles on the subject.

John J. Shank

York Chapter A.S.M. sustained a great loss on Sept. 16 when John J. Shank of Waynesboro died suddenly of a heart attack. He had been a charter member of the chapter, and was especially active in all A.S.M. affairs in his locality.

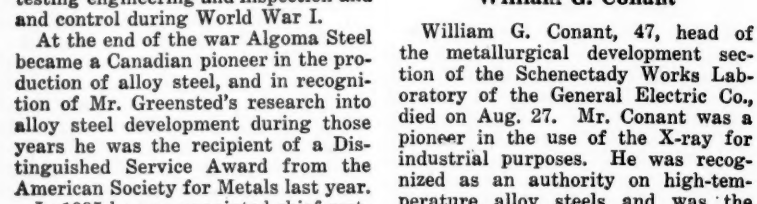
After graduating from Gettysburg College in 1921 and doing advanced work in Johns Hopkins Hospital, Mr. Shank came to Waynesboro and opened a chemical laboratory known as the Wayne Laboratories. He specialized in metallurgical and sanitary analysis, and at the present time the laboratory is one of the most modern and completely equipped in the East. Mr. Shank built up a large business in ore and mineral analysis and in the chemical and physical testing of metals.

In World War I he was attached to the Chemical Warfare Division, and in World War II did secret work for the Government. He was a director of the Landis Machine Co. and a director of the First National and Trust Co. of his native town.

—A. FLOYD WHALEN

James H. Spade, 58, consulting metallurgist, died Sept. 12 in Los Angeles. He was district sales manager for Allegheny Ludlum Steel Corp. and a past chairman of the Los Angeles Chapter A.S.M.

National Officers Visit Birmingham



Birmingham Chapter Opened the Fall Season With a Visit From A.S.M. National Officers. Left to right are J. P. Flood of Air Reduction Sales Co., chapter secretary; National Secretary W. H. Eisenman; H. A. Caldwell of Tennessee Coal, Iron and R.R. Co., chapter chairman; President A. E. Focke; and H. W. Gethin, Alabama Clay Products Co., vice-chairman. Dr. Focke spoke on "Radioisotopes in Metallurgy". (Reported by Sam F. Carter, American Cast Iron Pipe Co.)

Ont. Gets Grinding Tips, Hears About Fall Course

Reported by Ben Dixon
Assistant Sales Manager
Dominion Wheel & Foundries, Ltd.

The second meeting of the season for Ontario Chapter A.S.M. was held in Toronto on Oct. 7 and was addressed by L. P. Tarasov, metallurgist for the Norton Co. and a past chairman of the Worcester Chapter.

Mr. Tarasov's excellent talk on "Metallurgical Aspects of Grinding" has been reported in previous issues of *Metals Review*. The large audience benefited from many useful tips on the grinding of high speed toolsteels and the proper application of grinding wheels.

Chapter Chairman Bob Stewart announced the 1949 Fall Educational Course on heat treatment of metals. The course is under the direction of **I. A. Usher, of Ontario Research Foundation.**

THIRTY YEARS AGO

After a short life as independent organizations, the Steel Treating Research Society and the American Steel Treaters Society merged in 1920 to form the present American Society for Metals. The early issues of the official publications of these two societies (1917-1920) are filled with nostalgic and historical associations.—Ed.

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The first national Convention and Exhibit of the American Steel Treaters Society was held in Chicago Sept. 23 through 27, 1919. Headquarters were at the Morrison Hotel and the "Exhibit of Heat Treating Appliances and Heat Treated Products" was housed in the Seventh Regiment Armory.

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The Armory, says the *Journal*, is "the best exposition building in Chicago, with 26,000 feet of floor space and all desirable adjuncts." (Contrast this with the 200,000 sq.ft. in Cleveland's Public Auditorium, jammed to capacity by last month's 31st National Metal Exposition!)

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Again quoting the *Journal*: "This is the first National Exhibit of heat treating appliances and products ever held in the United States, and it is impossible to estimate the value of this gathering, not only from an educational standpoint, but also from an advertising and selling viewpoint." This forecast is more than vindicated by the success and expansion of the 30 succeeding "national metal congresses".

—30—

Extra-curricular activities during the first convention included plant visitations (Columbia Tool Steel Co., A. Finkl & Sons Co., Illinois Steel Co., and International Harvester Co. are some of the still-familiar names on the list); ladies' entertainment; band concerts; and informal banquet.

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A feature which may have been an early forerunner (in reverse) of the present A.S.M. Metallographic Exhibit was a "Chamber of Horrors" or "Morgue of Misspent Efforts". Contributions were invited of freaks and oddities, of spoiled parts caused by maltreatment, cracked tools and ruined structures, with the hope that "a post-mortem of that kind should prove not only constructive but entertaining".

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The technical program for the convention listed 59 papers, and the roster of authors included such names as Frederick J. Griffiths, then of Central Steel Co., Massillon, Ohio, and now a steel consultant and holder of one of the A.S.M. Alloy Steel Distinguished Service Awards; H. H. Harris, then of Swedish Crucible Steel Co., now (and for as long as most A.S.M.ers can remember) president of General Alloys Co.; Arthur W. F. Green, then of John Illingsworth Steel Co., now chief metallurgist for Allison Division of General Motors Corp. and a past chairman of the Philadelphia Chapter; Ray T. Bayless, then of James H. Herron Co., but for the past 27 years on the other side of the fence running the A.S.M. technical program rather than contributing the papers; and Prof. A. E. White of University of Michigan, elected national president of the society the following year.

Protective Coating for Wire Screen Stumps Industry, York° Learns

Reported by A. Floyd Whalen
Metallurgist and Chemist

A visit to American Wire Fabrics Corp. at Mt. Wolf, Pa., opened the 21st season of the York Chapter A.S.M. on Sept. 14. This plant makes screening from aluminum, tin, bronze and copper wire, and is responsible for 70% of all the insect screen made in the world. A day's output at Mt. Wolf averages 46.3 miles, while a monthly area of 14,000,000 sq.ft. comes off the looms; the company uses 750 tons of steel wire per month.

These and many other interesting facts were revealed by Roland L. Hoenstine, superintendent of the plant, who addressed the members in the evening. For steel screening, a wire made of low-carbon (0.08%) silicon-killed steel is used. It is drawn from 5-gage stock through tungsten carbide dies to 0.010 in. for the cross wires or woof, and to 0.0115 in. for the length or warp.

For aluminum wire, alclad is used. It stands up well any place 60 miles or more away from the coast; closer than that, salt air oxidizes the coating and causes brittleness.

Plastic screening came in with a bang and was extensively advertised, but went out with a speed approximating atomic fission; smokers burnt it easily, beetles loved it and in the tropics would eat a screen in a night. It also contracted under even ordinary temperatures, pulling out from its frame.

Mr. Hoenstine's plant is well equipped with assembly lines for applying paint, electroplated zinc, and other protective coatings. However, one of the unsolved problems facing research in this industry, he said, is to find a paint or other coating that will stand up in the weather and will not stain surrounding white paint. All metals tried so far—even stainless steel and bronze—have failed, and a fortune awaits anyone who can find a paint or coating that will stop this one great trouble, the speaker predicted.

Members Take Part In Group Discussion To Plan Program

Reported by D. W. Grobecker
Metallurgical Engineer
Los Alamos Scientific Laboratory

An informal dinner was held on Sept. 13 by the Los Alamos Chapter A.S.M. Purpose of the meeting was to get the members better acquainted, to discuss the program for the coming year, and to hear members' suggestions on chapter policies.

After dinner the new chapter officers and trustees were introduced by Chairman Arthur S. Coffinberry. The remaining members introduced themselves with short resumes of their experiences in this and other A.S.M. chapters.

Secretary-Treasurer Denton T. Doll (past secretary, treasurer, and chairman of many committees in the Cleveland Chapter) read the minutes of the last executive meeting. Suggestions made by the executive committee were used as discussion topics.

James M. Taub, past chairman, briefly outlined the history of the Los Alamos Chapter. In addition to being the first technical society to install a chapter at Los Alamos, Mr. Taub pointed out, the A.S.M. has been one of the most enthusiastically supported technical organizations on the project.

Eric R. Jette (Henry Marion Howe medalist) spoke on the attitude of the administration toward technical organizations on the project. Dr. Jette stated that the administration has and will in the future do all in its power to encourage technical societies. Such organizations are considered to play an important part in the development of a professional man.

Clyde R. Tipton, program committee chairman, then outlined the tentative schedule for the season. Francis M. Walters (Henry Marion Howe medalist and cofounder of the Mahoning Valley Chapter) suggested that full use should be made of speakers available on the project. A number of men who are recognized authorities on metallurgical and kindred subjects are members of the local chapter. William W. Wellborn, past chairman, suggested that speakers be sought whose subjects would interest the metal tradesmen on the project to encourage their membership.

Active participation of the membership in this meeting was so great that only a portion of the subjects planned for discussion could be covered.

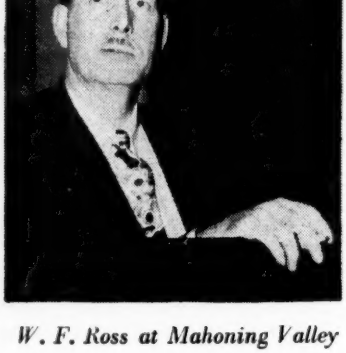
Heating Furnaces Keep Pace With Mass Production

Reported by J. G. Cutton

Metallurgist
Carnegie-Illinois Steel Corp.

"Industrial Heating Furnace Equipment" was the subject discussed at the Mahoning Valley Chapter's first meeting on Oct. 12. W. F. Ross, sales engineer, Electric Furnace Co., was the speaker.

Mr. Ross characterized electric furnaces as to type, construction, heating methods, control and atmosphere. An important factor in the field of metallurgy, the heating furnace has kept pace with mass production industries through the use of atmosphere control and continuous furnaces. New lightweight refractories are in general use.



W. F. Ross at Mahoning Valley

Some continuous annealing furnaces have a cooling chamber 2½ times longer than the heating zone, and Mr. Ross explained how the "hairpin" type furnace saves considerable heat. In this type of furnace the parts which are cooling can simultaneously heat the cold incoming parts. The many advantages of the cast electric heating element over the wire or ribbon element were explained.

O.S.U. Receives Two Metallurgy Fellowships

Two fellowships have been received in the department of metallurgy at the Ohio State University beginning with this school year. One is by the International Nickel Co. and the other is by the Titanium Alloy Mfg. Division of National Lead Co. Both fellowships are for $1500 per year and both cover a period of two years.

William H. Santschi is the recipient of the International Nickel fellowship and F. Lewis Orrell, Jr., is the recipient of the Titanium Alloy fellowship. Both of these men are working for their doctor's degrees in metallurgy.

Recent Metallurgical Developments Are Technological Rather Than Fundamental

Reported by C. G. Atchinson

Assistant Chief Metallurgist
Sheffield Steel Corp.

Relatively few fundamental metallurgical developments have taken place during the past ten years, declared Ernest E. Thum, editor of *Metal Progress*, when he spoke before the Kansas City Chapter A.S.M. on Sept. 21. Great *technological* progress was made in the adoption of old ideas to meet the demands of production for war, but after this was accomplished few people had sufficient energy left over for original thinking, and few facilities were available for laboratory or pilot-plant experimentation.

The exhaustion of our bonanza deposits has forced great changes in our ideas of what constitutes an "ore". The copper producers were the first to make the change; whereas 6 to 8% copper ore was common in 1900, now most of our copper is being profitably produced from 1% or leaner ores. Sea water is being used as an "ore" for the production of magnesium. The rich iron ore deposits of the Mesabi Range are rapidly being depleted and the surrounding taconite deposits of astronomical tonnage, containing about 40% iron, now seem to present the most attractive future source of iron ore by concentration methods already perfected. This in spite of the possible development of new, rich iron ore deposits in Laborador—still only a "prospect"—and of established mines in Brazil. It is unthinkable, in the speaker's opinon, that America should lose control of its most essential resource—iron ore.

Mr. Thum believes that the most important development in the steel industry is the use of pressure tops on blast furnaces. In the modern, heavy furnaces this development has increased the production rate over 20%, with reduced coke consumption and with fairly low capital investment to make the change.

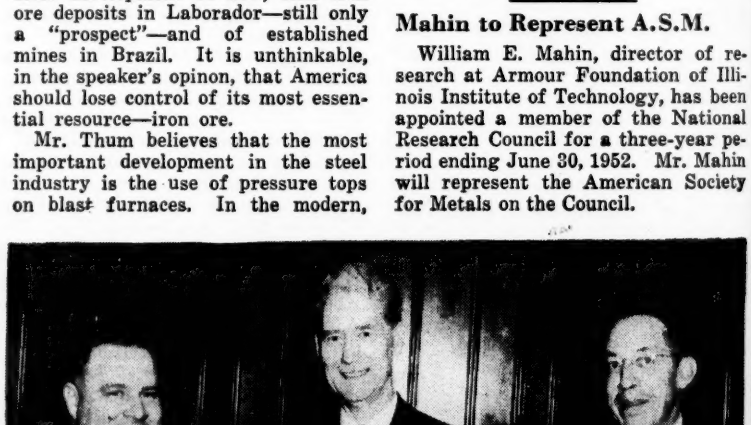
Use of oxygen in the blast furnace awaits the production of cheap oxygen in big quantities. Use of oxygen in the openhearth, either added to the flame during meltdown or introduced directly into the bath to reduce carbon, has proven profitable, even with fairly high-cost oxygen. The production rate has been appreciably increased but, unfortunately, most openhearth shops have been very tightly engineered and an increased production rate (except in one or two of a line of furnaces) usually snarls up the charging or pouring pit facilities.

The continuous casting of steel billets at the Beaver Falls plant of Babcock & Wilcox is another important development. Many problems remain to be worked out, despite the fact that similar practices have been operating steadily for some years in the copper and brass mills.

In the nonferrous field, the most important developments have been in the strong alloys of aluminum, the greatly expanded use of magnesium, the gathering of necessary data on the rarer metals like beryllium and titanium, and special metals and ceramic-clad metals for high-temperature service in jet applications.

Mahin to Represent A.S.M.

William E. Mahin, director of research at Armour Foundation of Illinois Institute of Technology, has been appointed a member of the National Research Council for a three-year period ending June 30, 1952. Mr. Mahin will represent the American Society for Metals on the Council.



Ernest E. Thum (Center), Editor of Metal Progress, *Was the Principal Speaker at the September Meeting of the Kansas City Chapter. Left is J. M. Goldsmith, chapter chairman, and right, Frank Trimble, vice-chairman*

Deep Drawing Utilizes Persuasion and Coaxing Instead of Brute Force

Reported by B. J. Lazan
Head, Materials Engineering Dept.
Syracuse University

The metallurgical and design aspects of stamping as a fabrication process were discussed by J. Walter Gulliksen, general superintendent of the Worcester Pressed Steel Co., before the September meeting of the Syracuse Chapter A.S.M. An extremely interesting selection of stamped parts—some very intricate and ranging in size from small ball bearing retainers to large oil pans—illustrated the speaker's various points.

The history of stamping dates from the small, simple cane ferrule of 1868 to the large and intricate parts encountered in present-day engineering; these frequently require thousands of tons of pressure. This evolution was explained in terms of the theory of deep drawing and its relationship to elastic limit and plastic flow range.

Persuasion and coaxing are as much superior to brute force in the stamping industry as in handling people, Mr. Gulliksen pointed out, and presented an interesting analogy between human behavior under stress and metal behavior during deep drawing. Die design is the significant factor in persuasion, and the speaker explained the relationship of die design and metallurgical properties of materials to such deep drawing faults as punching and wrinkling.

The speaker left the justifiable impression that the product designer should frequently revaluate design and fabrication methods from point of view of cost reduction through use of stamping. Not only do cost factors dictate such a study but frequently the strength and weight factors favor use of stamping. Although stampings are best adapted to quantity production, use of inexpensive low production dies has made the application of stampings less restricted, he concluded.

The coffee speaker of the evening was James Decker of the Syracuse University athletic department who discussed 1949 football.

IMPORTANT MEETINGS
for December

Dec. 4-7—American Institute of Chemical Engineers. National Meeting, William Penn Hotel, Pittsburgh. (Hugh L. Kellner, publicity committee, A.I.Ch.E., 50 East 41st St., New York 17.)

Dec. 6—Society for Applied Spectroscopy. Polarized Infrared Spectra, Socony-Vacuum Training Center, 63 Park Row, New York. (Rodger W. Loofbourow, Merck & Co., Inc., Chemical Control Division, Rahway, N. J.)

Dec. 8-10—American Institute of Mining and Metallurgical Engineers. Seventh Annual Conference of the Electric Furnace Steel Committee, Hotel William Penn, Pittsburgh. (Ernest Kirkendall, secretary, Metals Branch, A.I.M.E., 29 West 39th St., New York 18.)

Dec. 8-10—National Society of Professional Engineers. Annual Meeting, Houston, Texas. (Mason G. Lockwood, general arrangements chairman, N.S.P.E., Houston Engineers Club, 2615 Fannin St., Houston, Texas.)

Compliments

To A. H. d'ARCAMBAL, past national president A.S.M., on observance of the 30th anniversary of his association with Pratt and Whitney Division, Niles - Bement - Pond Co., Hartford, Conn., where he is vice-president and sales manager of the small tool and gage division.

To WHEELCO INSTRUMENTS CO., Chicago, on receipt of an award for a deflection-type temperature recorder, entered in the 11th annual product design competition sponsored by the publishers of *Electrical Manufacturing.*

To HORACE C. KNERR, president of Metlab Co., and M. M. KENNEDY, SR., materials engineer at the Philadelphia Naval Base, on the honorary dinner and citation presented them in recognition of their 25 years as part-time members of the faculty of Temple University.

To R. A. WILKINS, vice-president, Revere Copper and Brass, Inc., Rome, N. Y., on his appointment as honorary corresponding member (for the United States) by the British Institute of Metals—one of three men in this country so designated.

To PAUL D. MERICA, executive vice-president of the International Nickel Co. of Canada, Ltd., on his election as a director of Babcock & Wilcox Co.

To LEONARD G. DANIELS, metallurgical engineer, Precision Metalsmiths, Inc., on the award of the $300 first prize for his article in the Economy-in-Production contest, published in the October issue of *Metal Progress;* to CHARLES R. FUNK, chief metallurgist, American Locomotive Co., Railway Steel Spring Division, for winning second prize; to JOHN F. TYRRELL, research metallurgist, Solar Aircraft Co., third prize winner; and to J. C. HEYMANN, metallurgical engineer, Steel and Tube Division, Timken Roller Bearing Co., for fourth prize.

A. R. Troiano Named to Professorship at Case

Alexander R. Troiano has been appointed professor of physical metallurgy at Case Institute of Technology. Since 1939 he has been professor of metallurgy at the University of Notre Dame.

A recognized authority on alloy steels, heat treatment of alloys and X-ray structural and metallographic studies of the phase transformations in metals, Dr. Troiano will divide his time at Case between research and instruction. He will teach a course in the application of X-rays to metals and will instruct senior metallurgical students in advanced physical metallurgy.

Dr. Troiano received his A.B. degree from Harvard University in 1931, his M.S. in 1937 and D.Sc. in 1939. He is currently chairman of the Advisory Committee on Metallurgical Education of the American Society for Metals, as well as serving on committees of the American Institute of Mining and Metallurgical Engineers and the Engineering Foundation.

President and Secretary Visit Southeast Chapters

Reported by Richard L. Priess
Associate Editor
Southern Power & Industry

Initial stop on the recent Southeastern trip of President-Elect Arthur E. Focke and Secretary William Eisenman was the Georgia Chapter in Atlanta, where National Officers' Night was observed on Sept. 12. The Atlanta Chapter of the American Society of Tool Engineers participated in the excellent program.

Emphasizing that there is no merit in making tests just for fun, or because someone thinks they should be made, or just from habit, Dr. Focke effectively explained "How Acceptance and Why Testing Can Contribute to Better Production". Since Dr. Focke will address a good many of the local chapters during the course of the current season, his remarks will not be reported in detail here.

Prior to Dr. Focke's address, Mr. Eisenman spoke briefly on the general affairs of the society.

Utah Hears Ceramic Engineer

Reported by C. P. Mott
Production Manager
Christensen Diamond Products Co.

M. A. Fay, ceramic engineer of the General Refractories Co., research department, addressed the Utah Chapter A.S.M. at its monthly meeting on Sept. 15 in Salt Lake City. Mr. Fay spoke about the application of silica refractories in modern furnaces.

Describes Wide Variety of Steel Coatings

Left to Right at West Michigan Chapter Are W. S. Warnock, Armco Steel Corp. Representative; Reid L. Kenyon, Associate Director of Research for Armco and Speaker of the Evening; and Richard C. Fox, Chapter Chairman

Reported by John V. Norris
Assistant Metallurgist
Diesel Equipment Div., G.M.C.

Coatings on steel for decorative and protective purposes encompass a wide variety of finishes, the West Michigan Chapter A.S.M. learned at its September meeting. Nonmetallic finishes, metallic coatings, combinations of the two, porcelain enamel and stainless steel were described in various types of services by Reid L. Kenyon, associate director of research for Armco Steel Corp.

The adherence of paints and lacquers to sheet metal has been helped tremendously by the phosphate treatment of galvanized and "Zincgrip" sheets at the mill, and by proper selection of paint systems for subsequent coatings, Mr. Kenyon said. The advancement of protective coatings and finishes for sheet metal is responsible for the decorative and durable finishes found on modern diesel trains and buses, metal furniture and numerous other articles.

The life of automobile mufflers and other parts subjected to heat and moisture has been greatly increased by aluminized coatings. Another coating which has progressed far from the standpoint of wear, beauty and durability is porcelain enamel. Many porcelain enameled building fronts have stood for years with little or no maintenance cost.

Electropolishing and sandblasting of stainless steel for decorative finishes has progressed a long way in the past few years. Many common articles in use on our cars and in our homes are made from stainless steel.

Mr. Kenyon's Kodachrome slides were especially attractive and did real justice to the coatings and finishes discussed in his talk.

Art of Stamping Explained

Reported by G. F. Kappelt
Metallurgist, Bell Aircraft Corp.

The art of the metal stamping specialist was explained by J. W. Gulliksen, general superintendent of Worcester Pressed Steel Co., at the September meeting of the Buffalo Chapter A.S.M. His talk is outlined in some detail in the report on page 13. To support his views Mr. Gulliksen displayed many samples showing the intricacies of stampings.

New Group at Brooklyn

A subgroup of the New York Chapter A.S.M. has been formed by a number of junior members at Polytechnic Institute of Brooklyn. Three old members and 22 new members are listed on the charter roll of the new group. It will be known as the Polytechnic Institute of Brooklyn Group of the New York Chapter. William Pollack, a junior member at Brooklyn Polytech, has been instrumental in the formation of the group.

Electric Power Seen as Heat Treating Commodity

Reported by Wilhelm Olson
Atwood Vacuum Machine Co.

Members of the Rockford Chapter A.S.M. spent a part of the afternoon of Sept. 14 in visiting the power plant of Central Illinois Electric and Gas Co. The dinner meeting featured a talk by H. E. Braunig, vice-president in charge of operations of the same company, on "What Mr. Reddy (company trademark) Kilowatt Means to Industry in Rockford".

Electric power, it was realized when Mr. Braunig finished, is as much a heat treating commodity as any metallurgical supply item one might think of. A very lively question period—some of it serious, some amusing—followed the talk.

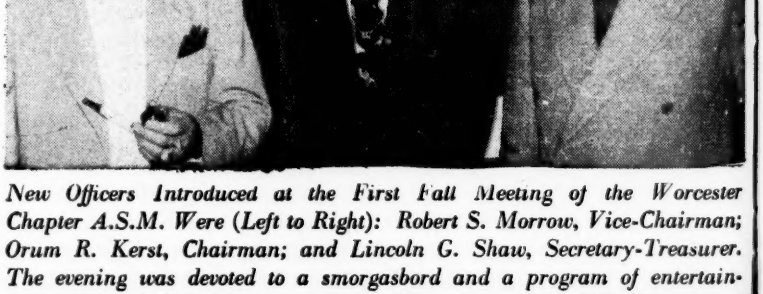
Atomic Energy Discussed

Reported by H. O. Nordquist
Manager, Alloy and Stainless Steel Dept. Joseph T. Ryerson & Son, Inc.

Implications of atomic energy toward modern industry, and its probable methods of control, were discussed by Ernest E. Thum, editor of *Metal Progress*, before the September meeting of the St. Louis Chapter.

Full utilization of nuclear energy under proper controls could certainly make this world a more pleasant place in which to live, he pointed out. On the other hand, the horrors of misapplied atomic energy were illustrated by the severe death tolls of the atomic bomb in World War II.

New Officers Introduced at Social Meeting



New Officers Introduced at the First Fall Meeting of the Worcester Chapter A.S.M. Were (Left to Right): Robert S. Morrow, Vice-Chairman; Orum R. Kerst, Chairman; and Lincoln G. Shaw, Secretary-Treasurer. The evening was devoted to a smorgasbord and a program of entertainment. Prof. Buford Jasmine, author and lecturer, spoke on "The Beauties of New England". (Reported by C. Weston Russell, Wyman-Gordon Co.)

A-Bomb Stockpile Estimate is 100-300, Other Uses Indicated

Reported by R. E. Samuelson

Chemist, Beech Aircraft Corp.

At least four types of atomic "engines" are under design and construction in the nation today, Ernest E. Thum, editor of *Metal Progress*, engineer, author, and lecturer, told members of the Wichita Chapter A.S.M. in a joint meeting with the Wichita Council of Technical Societies on Sept. 22. However, Mr. Thum prophesied that an atomic-powered device for long-distance aircraft (probably remote-controlled from a mother aircraft) will be the first actual development of useful atomic power.

Speaking on "Implications of Atomic Energy", the editor said that the United States probably has somewhere between 100 and 300 atomic bombs ready for instant assembly. He based his statement on a number of facts and a little prophecy.

Three months ago the number of six-engine, long-range B-36 bombers was announced in a Congressional investigation. At the present time the U. S. has approximately 80 of these in operational condition. There is no reason for having the planes except to carry atom bombs, and there is reason to believe that there is at least one bomb for each plane. Hence the minimum estimate of 100 bombs.

Mr. Thum stated that this nation imported 240 tons of uranium metal in 1941, adding that with refinery and reasonable recovery, a ton of fissionable U-235 or plutonium is produced from such a tonnage. Uranium imports are greater now than they were in 1941; likewise about 1 ton of uranium metal is contained in the concentrates made each day from the vanadium-ore tailings in mills in western Colorado. The latter amount alone will contain 3 tons of fissionable U-235 in the course of a year's production.

The speaker estimated that 20 to 25 lb. of uranium is required to produce a bomb. He based this estimate on a calculation of the mean free path of the neutron (the "trigger") in a mass of pure uranium metal.

Ample uranium is therefore available for 150 bombs a year, and the President's advisory commission on air power early in 1948 recommended the construction of that many long-range bombers per year for a period of five years. Hence the reason for the upper estimate of bombs—2 years at 150 bombs, or 300 bombs.

America has been successful at applying scientific discoveries on fission made by British, German and Italian scientists, but Americans have made relatively few fundamental discoveries. Today nearly all 92 chemical elements can be made artificially radioactive quite cheaply, merely by inserting them into the plutonium-producing "piles" at Oak Ridge (Tenn.) or Hanford (Wash.).

These radioactive elements have unparalleled value as research tools, and eventually will be used for the control and cure of such fatal diseases as cancer and leukemia. Radioactive iron and other elements are being used for industrial research in such fields as wear studies.

Phil Koerner, chairman of the Wichita Chapter, introduced the speaker, and Fred N. Smith, chairman of the 12-society council, presided.

Bellows Offers Motion Picture

A new 16-mm. black and white sound motion picture just released by the Bellows Co. is a case history film showing the use of "controlled air power" in effecting cost reductions in various manufacturing and metalworking processes.

The 28-min. film titled "Production Miracles Through Controlled Air Power" is available for showing, without cost, to plant executives in their own plant. Arrangements for showing the film can be made by writing W. C. Richards, Jr., Bellows Co., Akron, Ohio, or by phoning any of the company's regional sales offices.

Ductile Cast Iron Shows Interesting Strength Properties

Reported by Richard L. Moncrief

Frigidaire Division, G.M.C.

"Ductile Cast Iron—a New Engineering Material" was the subject of the September meeting of the Dayton Chapter A.S.M. Richard B. Kropf of the International Nickel Co. discussed the interesting properties obtainable in cast iron when magnesium is added to put the graphite in spheroidal form instead of the flake form common to gray cast iron.

In the as-cast condition, Mr. Kropf pointed out, tensile strengths on the order of 85,000 to 105,000 psi., with some ductility, are typical. Simple annealing develops ferritic structures which show 15 to 20% elongation and 65,000 to 75,000 psi. tensile strength. Normalizing and tempering have developed a yield strength of 116,000 psi., a tensile strength of 127,000 psi., and 2.0% elongation. Quench-and-draw treatments and additional alloying can be used for higher levels of strength.

The speaker showed by the stress-strain diagram that ductile iron is elastic, in the generally accepted sense, and is considerably stiffer than flake iron, having a proportionality of strain to stress up to high loads, with a modulus of elasticity of 25 million psi. Ductile cast iron has endurance properties and resistance to destructive growth at high temperatures which are superior to those of gray cast iron.

Machinability of this new material, according to Mr. Kropf, is equal to that of gray iron of the same hardness and much superior to that of gray iron of equivalent transverse or tensile strengths.

Casting quality, after spheroidizing treatment, is excellent, with fluidity about the same as gray iron of similar base composition. This iron, however, has a distinct tendency toward piping, and inadequately fed sections may collapse inwardly instead of forming porous internal shrinkages. This characteristic can facilitate the inspection of castings.

Mr. Kropf cited examples of applications where ductile iron is used instead of gray iron or cast steel because it possesses better strength and ductility than the former and better casting characteristics than the latter. Forty-three foundries are now licensed to use the spheroidizing treatment.

Discussion of the subject was somewhat limited because of the fact that the process is covered by patents pending and Mr. Kropf was not at liberty to answer questions freely in regard to some of its details.

Prizes Offered for Papers

To stimulate interest in existing applications for cast stainless steel and to encourage further advances in this field, the Cooper Alloy Foundry Co. has announced that it will offer cash and prize awards totaling more than $5000 for the best technical papers submitted in accordance with the rules of its proposed essay contests. Major fields of application will be covered, with the chemical field selected for the first contest.

Papers dealing with "Applications for Cast Stainless Steel in the Chemical Industry" will be accepted between Oct. 1, 1949 and May 1, 1950. First prize in the chemical industry contest is $250, second prize $150, and third prize $100. Complete information may be obtained from the Cooper Alloy Foundry Co., Hillside, N. J., attention Contest Editor.

New Cadillac Engine Incorporates Examples Of Metallurgical Ingenuity

Reported by G. A. Warwick

General Electric Co.

The first of a promising series of combined dinner meetings and technical sessions sponsored by the Fort Wayne Chapter A.S.M. was held on Sept. 12, with a review of the important engineering and metallurgical factors concerned with the new Cadillac engine development program. The lecture was presented by H. F. Barr, staff engineer of the Cadillac Motor Car Division, General Motors Corp.

Mr. Barr stressed the importance of available fuel octane ratings, intensive tests on each engine part, and plain, old-fashioned competition as a basis for the 7.5:1 compression ratio with reduced weight and physical dimensions introduced in the 1949 Cadillac power plant. Ignition and carburetion systems, cylinder head and walls, connecting rods, crankshaft, and tappets were given a rigid analysis and changes resulted.

An example of metallurgical ingenuity is the method by which valve seat pounding and wear were reduced by increasing the seat hardness of the cylinder head and providing a more uniform cooling condition in this area. A chromium-silicon ladle addition is made to the basic hard iron so as to obtain a minimum Brinell hardness of 163 at the valve seat.

The speaker's description of tappet characteristics was received with enthusiasm by the audience. Here the problem was to design a treatment which would combine the run-in properties of iron with the high fatigue strength of steel. This objective was finally realized by controlled grit blasting of the tappet face after finish honing the 5120 steel parts which are previously carburized and hardened to Rockwell C-60 to 63. A final Lubrite antiscuff treatment is given to the finished tappet face.

Donovan Dollars Reward Members At Heat Treat Quiz

Reported by H. L. Sittler

Metallurgist, Arcrods Corp.

Quite a number of "Tom Donovan dollars" were distributed among the members of the Baltimore Chapter A.S.M. at the opening of the season on Sept. 19. On this occasion Tom Donovan, "Professor I. Q. of the tool and die heat treating industry", interspersed his lecture with quiz questions, rewarding the member of the audience who could give the right answer with a silver dollar in a leather case (a half dollar if the answer was only half right).

Mr. Donovan spoke on "Tool Engineering and Heat Treating", presenting the practical solution for various problems that arise in the heat treating of tools and dies.

The effect of drawing time on shrinkage or dimensional stability was described. Those little "tricks" used by the practical commercial heat treaters—those unusual practices which are used to convert near-failure into success—were described by Mr. Donovan, with numerous illustrations from actual case histories.

The "feel" of the steel and, as it is quenched, the warning it gives to the experienced practical furnace man are signs which must be heeded. Furnace temperature and its uniformity must be judged by the operator—the thermocouple can tell him the temperature only at the point where it is, and at best thermocouples can be placed at relatively few spots in the furnace.

Typical of the questions asked in the course of the evening were: "What metal cannot be cast, forged, rolled or machined?" "What metal, once it is hardened, cannot be annealed?" The able manner in which the talk was presented, and the ability of the speaker to draw out the various members of the audience made for both an interesting and instructive evening.

The coffee speaker was G. N. Brancato, meteorologist in charge of the local Weather Bureau, who spoke on the "Problems of a Weather Man".

Buffalo Has Golf Party

Reported by G. F. Kappelt

Metallurgist, Bell Aircraft Corp.

The Brace-Mueller-Huntley trophy was won by Jim Wordman on Sept. 23, at the annual golf party of the Buffalo Chapter A.S.M. Many of the chapter's best golfers competed for this valued prize, and some were consoled by special awards. As usual, the dinner following the match was attended by many other members as well as the golfers. More than 40 of them went home richer by a fine door prize.

National Officers Visit Oak Ridge

National President-Elect Arthur Focke (Left) Uses the Blackboard to Demonstrate an Amusing Point in His Talk on "Fatigue of Metals" Before the Oak Ridge Chapter A.S.M. on Sept. 15. Next, in order, are Lawrence K. Jetter, past chapter chairman; National Secretary W. H. Eisenman; Chapter Vice-Chairman James R. McGuffey, and Chairman E. Eugene Stansbury.

Describes Experiments on Use of Tracer Elements

Reported by **E. T. Champlin**
Metallurgist, Allis-Chalmers Mfg. Co.

"Industrial Significance of Atomic Energy" was discussed by J. T. Wilson, physicist, Allis-Chalmers Mfg. Co., at the Sept. 20 meeting of the Milwaukee Chapter A.S.M.

Dr. Wilson reviewed the development over the past 25 years in the field of atomic architecture, explaining the functions of the fundamental particles, namely, electrons, protons, positrons, neutrons, and mesons. He told how alpha, beta and gamma radiation is used in science and industry, and described the Betatron and Cyclotron.

Various experiments are under way, he said, on the use of radioactive isotopes — particularly carbon — as tracer elements in the study of metals, plant life, drugs, and the oil refining industry.

Work and Eisenman Honor N. J. on Officers' Night

Reported by **R. A. Grange**
U. S. Steel Corp. Research Laboratories

At its opening meeting of the new season on Sept. 17, New Jersey Chapter A.S.M. was honored by the presence of National President Harold K. Work and Secretary William H. Eisenman. Chapter Chairman John S. Ross welcomed the national officers, after which Mr. Eisenman talked informally about A.S.M. affairs. Dr. Work presented an excellent technical lecture on "Some Factors Affecting the Cold Working Properties of Steel".

Twenty-five-year membership certificates were then presented by Secretary Eisenman to T. G. Gilley, plant metallurgist for Western Electric Co. and last year's chapter chairman, and to Geo. P. Igleheart, vice-president of Stapling Machine Co.

Heat Treating Series Is Opened With Lecture On General Fundamentals

Reported by **G. Wesley Fischer**
Metallurgist, Wm. Powell Co.

Fundamentals of general heat treating were clarified at the first fall meeting of the Cincinnati Chapter A.S.M. on Sept. 8. Richard D. Manning, supervising technologist, heat treating research, Carnegie-Illinois Steel Corp., presented the lecture on "Principles of Heat Treating". His talk was preceded by an after-dinner speech by William Foster Hopkins, noted Cincinnati criminal lawyer.

Using isothermal and continuous cooling diagrams of the A.I.S.I. 8630 steels, Mr. Manning explained how these curves, considered separately and together, aid in the formulation of various heat treatments to give desired microstructures. Photomicrographs of various structures were then shown and explained with reference to the isothermal diagram. Bainites formed at temperatures in the lower portion of the bainite transformation zone of the isothermal diagram have a toughness that compares favorably with that of tempered martensite, the speaker pointed out.

The alloying elements in a steel should always be sufficient to give as close to 100% martensite as possible with an austenitizing and quench treatment, Mr. Manning explained, if optimum properties are desired.

This program on general heat treating will be followed by others covering specific heat treating problems.

Understanding of Magnetism Based On Atom Structure

Reported by **Alexander Lesnewich**
Rensselaer Polytechnic Institute

"In order to understand the nature and behavior of magnetic alloys we must study the natural structure of the atoms themselves." Thus did Dolph Ebeling, development metallurgist for the General Electric Co., introduce his topic "Metallurgy and Magnetism" to the 70 members and guests who attended the opening meeting of the Eastern New York Chapter A.S.M. on Sept. 13.

The modern theory of solids is based on the fundamentals of quantum mechanics, Mr. Ebeling said, and then demonstrated how these concepts can be coordinated with our knowledge of metals to explain the phenomenon of ferromagnetism. These theories have been of tremendous practical value in the development of magnetic alloys having properties far superior to those thought possible only a few years ago.

The talk began with a brief presentation of the Bohr model of the atom and the principle of wave mechanics wherein the seat of ferromagnetism was shown to be in the individual magnetic fields created by the spinning electrons which surround the atom nuclei. This gives a rational explanation of the occurrence and varying intensities of magnetism in the three elements, iron, cobalt and nickel, and their alloys.

After a brief review of the existence and behavior of magnetic domains, the speaker explained the nature of the well-known magnetization curves and hysteresis loops. The effects of crystal anisotropy can be explained in terms of the behavior of the electron clouds within the crystal; this effect is related to the "squareness" of the hysteresis loop. Finally, Mr. Ebeling characterized some of the various types of magnetic alloys by their magnetic "hardness", and showed how the coercive force of the material is related to the internal strains and magnetostriction coefficient.

The talk was an excellent demonstration of the technological benefits that can result from the combination of fundamental concepts of physics and metallurgy. Although dealing with some of the most difficult concepts of modern physics, Mr. Ebeling's development of the subject gave the audience a real insight into the mystery of magnetism.

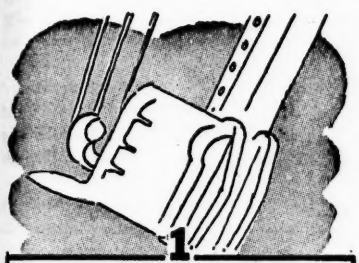
CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Dec. 14	University Club		Family Night
Baltimore	Dec. 19	Engineers Club	R. Carson Dalzell	Copper and Its Alloys
Boston	Dec. 2	Hotel Sheraton	R. W. Snowdon	Supersonic Testing of Large Forgings
Buffalo	Dec. 8	Hotel Statler	Robert H. Aborn	Metallurgy of Ferrous Welding
Calumet	Dec. 13	Phil Smidts, Hammond, Ind.	Walter E. Jominy	National Officers' Night
Canton-Massillon	Dec. 2	American Legion Home		Monte Carlo Party
Cedar Rapids	Dec. 13	Hotel Roosevelt		Family Night
Chicago	Dec. 12	Furniture Mart		Christmas Stag Party
Cincinnati	Dec. 8	Engineering Society		National Officers' Night
Cleveland	Dec. 5	Tudor Arms Hotel	J. H. Hollomon	Plastic Deformation
Columbus	Dec. 13	Battelle Memorial Institute	A. E. Focke	Radioactive Isotopes in Metallurgy
Dayton	Dec. 14	Engineers' Club	A. E. Focke	National Officers' Night
Eastern N. Y.	Dec. 6	Circle Inn, Latham, N. Y.		Christmas Party
Ft. Wayne	Dec. 12			Machining of Metals
Hartford	Dec. 9	Wright's Tavern, Plainville, Conn.		Christmas Party
Indianapolis	Dec. 19	McClarney's Restaurant	S. L. Hoyt	Some Practical Aspects of Metallurgical Research
Kansas City	Dec. 21	Pine Room, Union Station		Christmas Party
Louisville	Dec. 6		A. E. Focke	Radioisotopes in Metallurgy
Mahoning Valley	Dec. 13	V.F.W. Hall, Youngstown, Ohio		Christmas Party
Milwaukee	Dec. 5	Elks Club		Christmas Party
Montreal	Dec. 5	Queen's Hotel	E. E. Thum	Recent Developments in Stainless Steels
New Haven	Dec. 16	Town-Ho Inn, Milford, Conn.		Christmas Party
New Jersey	Dec. 12	Essex House, Newark		Annual Christmas Smoker
North West	Dec. 19	Lowry Hotel, St. Paul		Christmas Party
Notre Dame	Dec. 14	Engineering Auditorium	A. J. Scheid, Jr.	Tool Steel—The Key to Efficient Production
Ontario	Dec. 2	Leonard Hotel, St. Catharines	E. E. Thum	Metallurgy as a Philosopher Might Look at It
Ottawa Valley	Dec. 6	Assembly Hall, Lansdowne Park	E. E. Thum	Metallurgy as a Philosopher Might Look at It
Peoria	Dec. 12	Club Pioneer, Pekin, Ill.	Harley Wilhelm	Applications of Atomic Energy
Philadelphia	Dec. 9	Engineers Club		Winter Frolic
Pittsburgh	Dec. 9	Roosevelt Hotel		Christmas Party
Purdue	Dec. 13		Clarence Zener	Anelasticity
Rhode Island	Dec. 7	Providence Engineering Society Bldg.	H. M. Webber	High-Temperature Furnace Brazing
Rockford	Dec. 14	Faust Hotel		Christmas Party
Rocky Mountain	Dec. 15 Dec. 16	Pueblo Denver	J. W. Underwood	Modern Bearings and Their Materials
Saginaw Valley	Nov. 22	Frankenmuth	W. Bean	Stress Analysis in Metallurgical Engineering
St. Louis	Dec. 9	Melbourne Hotel		Christmas Party
Syracuse	Dec. 6	Onondaga Hotel	H. C. Frisbie J. McElgin	Machining Oils Quenching Oils
Terre Haute	Dec. 5	Indiana State Teachers College	M. Niefert	Fracture of Metals
Texas	Dec. 6			
Toledo	Dec.			Christmas Party
Tri-City	Dec. 13	Rock Island Arsenal Cafeteria	Lloyd Knowler	Quality Controls—Metallurgical Problems
Tulsa	Dec. 12	Michaelis	Kenneth Rose	Selection of Metals
Utah	Dec. 19	Salt Lake City		Christmas Party
Warren	Dec. 8	El Rio Restaurant		Christmas Party
Washington	Dec. 12	Garden House, Dodge Hotel	H. H. Harris	Modern Casting Techniques for High-Temperature Alloys
West Michigan	Dec. 19	Morton House, Grand Rapids		Christmas Party
Western Ontario	Dec. 9	Chatham	E. E. Thum	Recent Developments in Stainless Steel
Worcester	Dec. 14	Aurora Hotel	F. P. Zimmerli	Springs
York	Dec. 14	Lancaster, Pa.		

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor



ORE BENEFICIATION and RESERVES

1A—General

1A-52. Mineral Beneficiation by Gravity Concentration; A Fundamental Study. Robert D. Carpenter. *Idaho Bureau of Mines and Geology* (Moscow, Idaho), Pamphlet No. 84, Apr. 1949, 16 pages.

An investigation of the capacity factor in gravity-concentration processes, particularly those processes in which mineral beneficiation is effected in washed, flowing pulp films on inclined surfaces.

1A-53. Preliminary Investigation of Concentrating Certain Minerals in Idaho Placer Sand. W. W. Staley and James S. Browning. *Idaho Bureau of Mines and Geology* (Moscow, Idaho), Pamphlet No. 87, June 1949, 23 pages.

A combination of screening, gravity methods, and magnetic separation for monazite, zircon, ilmenite, and magnetite. 15 ref.

1A-54. Ore-Dressing Notes. *Mining Magazine*, v. 81, Sept. 1949, p. 152-154.

The need of an acceptable phrase to describe ore-dressing or beneficiation. Data needed before planning control operations.

1A-55. Heavy-Media Separation. Walter P. Gillingham. *Compressed Air*, v. 54, Oct. 1949, p. 244-249.

New mineral concentrating process for use on a variety of materials including low grade coal and ore deposits.

1B—Ferrous

1B-58. Mining and Treating of Banded Taconite at Mary Ellen Mine. *Skillings' Mining Review*, v. 38, Sept. 24, 1949, p. 1, 4.

Pit equipment and layout, crushing plant, and heavy media plant for treating low grade ores in Minnesota.

1B-59. Iron Ore Preparation Plant. A. W. Leadbeater and Oliver Thomas. *Mechanical Handling*, v. 36, Sept. 1949, p. 519-529.

British plant.

1B-60. Beneficiation of Iron Ore. Grover J. Holt. *Blast Furnace and Steel Plant*, v. 37, Sept. 1949, p. 1061-1066.

Reviews the present iron ore reserve picture. Low-grade ore reserves and beneficiation procedures.

1B-61. HMS Taconite Treatment. *Mining World*, v. 11, Oct. 1949, p. 22-25.

Successful beneficiation procedure at the Mary Ellen Mine of the Stanley Mining Co., Minn., for recovering taconite.

1C—Nonferrous

1C-68. The Rare Earth Industry. Howard E. Kremers. *Journal of the Electrochemical Society*, v. 96, Sept. 1949, p. 152-157.

Extraction of Ce and other rare earths from monazite sand, and the principal uses. 13 ref.

1C-69. A Reaction Between Solids; The Formation of Zinc Ferrite From Zinc Oxide and Ferric Oxide. D. W. Hopkins. *Journal of the Electrochemical Society*, v. 96, Sept. 1949, p. 195-203.

The above was investigated from 600-1150° C. in an attempt to determine the effect of temperature of preparation of Fe_2O_3 on the rate of compound formation and to examine the mechanism controlling the rate within a given system of reactants. This reaction is of considerable importance in the extraction of Zn by acid leaching of roasted sulfides, since $ZnO \cdot Fe_2O_3$ is insoluble in dilute mineral acids. 13 ref.

1C-70. Investigations on the Production of Electrolytic Cobalt from a Copper-Cobalt Flotation Concentrate. H. L. Talboy and H. N. Hepker. *Bulletin of the Institution of Mining and Metallurgy*, no. 514, Sept. 1949, p. 1-19.

Laboratory and pilot-plant investigations. In one process the concentrate is smelted to matte from which the Co is leached with H_2SO_4 and recovered by electrolysis from the purified solution; in another process the concentrate is roasted and the Co extracted from the calcine by leaching with hot water, after which it is recovered from the purified solution by electrolysis. Processes are particularly applicable for recovery of Co from sulfide concentrates of relatively low Co content and high Fe-Co ratio.

1C-71. Selektive Flotation der Blei-Zink-Kupfer-Erze von Tsumeb. (Selective Flotation of Tsumeb Lead-Zinc-Copper Ores.) August Götte. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 1, Oct. 1948, p. 204-208.

Previously abstracted from *Archiv für Metallkunde*. See item 1C-67, 1949.

1C-72. The Ashcroft-Elmore Tin Process. H. L. Malan. *Mining Magazine*, v. 81, Sept. 1949, p. 137-143.

Process for recovering electrolytic tin from low-grade concentrates and complex ores. Includes diagrams of equipment.

1C-73. For Lower-Cost Regrinding. Franklin T. Davis. *Engineering and Mining Journal*, v. 150, Oct. 1949, p. 85.

Unusual Esperanza-type classifier in a special circuit for regrinding Cu flotation concentrate.

1C-74. Capturing Copper From Mine Water. Arthur Hoem. *Compressed Air*, v. 54, Oct. 1949, p. 260-261.

Modern procedure and equipment used to precipitate copper from mine water.

1D—Light Metals

1D-8. Die Grundlagen der wirtschaftlichen Verarbeitung von Rotschlamm. (The Principles of the Economic Processing of Red Mud.) Friedrich Vogel. *Metall*, July 1949, p. 223-225.

Why proposed methods for processing red bauxites are industrially uneconomical. Importance of devising a method of extracting from these minerals not only the iron and the titanium oxide but also the alumina and the sodium oxide.

1D-9. Alumina by the Bayer Process. *Industrial Chemist*, v. 25, Sept. 1949, p. 431-438.

Comminution of the ore, alkaline digestion, removal of silica, and precipitation of hydrate or alumina at a British plant.

For additional annotations indexed in other sections, see:
2B-262-277

SMELTING, REDUCTION and REFINING

2B—Ferrous

2B-256. Wiberg-Soderfors Method for the Manufacture of Sponge Iron. Bo Kalling and John Stalhed. *Steel*, v. 125, Sept. 19, 1949, p. 72-75, 102, 104, 106.

Procedure followed by a Swedish company. The reduction agent is

almost completely utilized for reducing and heating the ore. Energy is supplied by combustion of some of the fuel by oxygen gas or oxygen-enriched air, thus obviating use of electric energy

2B-257. Pilot-Plant Production of Steel From Sponge Iron. W. W. Stephens and J. L. Morning. *U. S. Bureau of Mines, Report of Investigations* 4498, Aug. 1949, 21 pages.

Tests in which several different types of sponge iron were used as charge material for production of steel in a 4-ton basic arc furnace. Equations for calculating the amount of reducing agent required to complete reduction of iron oxide and provide carbon in the bath at meltdown, weight of slag formed in melting sponge iron of a given analysis, and the increased power requirement for production of steel from sponge iron. Cost analysis.

2B-258. Induction Stirring in Electric Furnace Steelmaking. E. S. Kopecki. *Iron Age*, v. 164, Sept. 22, 1949, p. 73-78.

Economic, metallurgical, and operational advantages are said to result from agitation of arc furnace heats by induction stirring. Constructional features of an induction stirrer; results of its use in extensive steelmaking tests in Sweden. Production increase of 20% is reported.

2B-259. A Statistical Analysis of the Output of an Open-Hearth Furnace. F. L. Robertson and M. W. Thring. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 31-50.

Measurements of nearly all the important variables which might affect output were made on about 47 casts from a single furnace. The measurements were analyzed to determine those which are clearly related.

2B-260. Distribution of Materials in the Blast-Furnace. Part II. Compensated Charging. H. L. Saunders and R. Wild. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 61-70.

Extension of the work on the distribution of materials in the blast furnace by comparing the results obtained in the laboratory with those on a scale intermediate between the latter and full-size furnaces. Comparative results show the reliability of the models as predictors, the necessity for some scheme of compensated charging to eliminate segregation, and application of a scheme worked out in the laboratory to an experimental blast furnace.

2B-261. Teeming Practice; Overcoming Difficulties in the Production of Good Ingots. N. H. Bacon. *Iron and Steel*, v. 22, Sept. 1949, p. 417-421.

Tundish teeming and bottom pouring as alternatives to direct teeming. Includes calculations, diagrams, and tables.

2B-262. German Ferrous Metal Industry; B.I.O.S. Overall Report, No. 15. *Iron and Steel*, v. 22, Sept. 1949, p. 422-424.

Condensed version of report. Includes information on ores and ore preparation.

2B-263. Production of Pig Iron. Part I, II, III, IV. B. M. Stubblefield. *Steel*, v. 125, Sept. 12, 1949, p. 128, 130, 133, 136, 138, 140, 143; Sept. 19, 1949, p. 88, 91-92, 94, 97-98; Sept. 26, 1949, p. 78, 80, 83-84, 86, 88; Oct. 3, 1949, p. 84, 87-88, 90, 92, 94.

Part I: increase in production during the last half-century affected by improvements and refinements in auxiliary equipment, improved raw-material preparation and selection, and more intelligent handling of furnace operations. Part II: effects of fuel availability on location of iron and steel production. Description of byproduct ovens and blast furnaces. Part III: importance of correct refractories and auxiliary equipment. Part IV: the cast house, charging of raw materials, chemistry of furnace reactions, and modern trends in blast furnace construction and operating practice. 13 ref.

2B-264. Magnesium Additions and Desulphurization of Cast Irons. J. E. Render. *American Foundryman*, v. 16, Sept. 1949, p. 33-37.

Experimental work by the Canadian Bureau of Mines. Literature data on recovery of magnesium from different addition agents are of little specific use except as rough indications of efficiency, since the desulfurizing effect has not been distinguished from the residual amounts of Mg retained. If these effects are considered, and if residual S content after Mg treatment is assumed to withhold Mg from effective nucleation action in forming nodular graphite, a quantity called "nucleating Mg" is found to give good correlation in the metallurgy of Mg-treated cast iron.

2B-265. Electric Iron-Ore Smelting. Mohammed A. Kassem. *Metallurgia*, v. 40, July 1949, p. 145-149.

Early furnaces and the modern low-stack furnace; advantages and cost. Utilization of gas products in cement manufacture and for direct reduction.

2B-266. The Bessemer Process; Some Aspects Arising From a Study of Practice. *Metallurgia*, v. 40, July 1949, p. 150-154.

Report by a subcommittee, appointed by the British Iron and Steel Research Association, which has been investigating the possibilities of increased uses for bessemer steel.

2B-267. Steel-Making for Castings. E. C. Pigott. *Metallurgia*, v. 40, July 1949, p. 155-158; Aug. 1949, p. 190-193.

Processes for producing steel suitable for castings are bessemer, acid bessemer, Tropenas, electric arc, basic acid electric induction, basic openhearth, and acid openhearth. Choice of process for best balance of cost and quality.

2B-268. Nodulizing Gray Iron With Dilute Magnesium Alloy. *Iron Age* v 164, Sept. 29, 1949, p. 65.

Use of Mg alloy which contains 7% Mg, 45% Si, remainder Fe. Hazards of Mg addition are minimized and it may be employed without extensive modification of existing foundry practices. The alloy acts as an inoculating as well as a nodulizing agent. Another nodulizing agent showing promise is a briquetted mixture of Mg and Si-Zr.

2B-269. Desulphurization in the Basic Open Hearth Furnace Using Bauxite. Leslie Cook. *Blast Furnace and Steel Plant*, v. 37, Sept. 1949, p. 1067-1068.

Practice at Brazilian plant. Concludes that bauxite may be usefully employed in moderate quantities as a flux without hindering the rate of desulfurization.

2B-270. Kinetics of Ingot Solidification. (In Russian.) V. M. Breitman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 21, 1949, p. 385-388.

Proposes simple equations for the solidification of cylindrical and spherical ingots. Use of these equations indicates the moment of complete solidification, the rate of solidification, and the thickness of the solidified surface "crust" at a given time. Equation is solved for "ideal" materials and conditions; in practical application, it is necessary to introduce a coefficient depending on the physical and chemical properties of the particular material. Results of experiments on paraffin and steel confirm the validity of the equation.

2B-271. Electric Furnace Melting. W. O. Igelman and F. S. Nussbaum. *Metal Progress*, v. 56, Oct. 1949, p. 483-485.

Application of quality control methods to new equipment and processes at National Malleable & Steel Castings Co.

2B-272. Alloy Recovery. Charles R. Funk. *Metal Progress*, v. 56, Oct. 1949, p. 486-487.

Procedure for recovering Cr from steel scrap or ore in the basic openhearth.

2B-273. Graphite Stool Inserts for Big-End-Down Molds. W. Earle Black. *Iron and Steel Engineer*, v. 26, Sept. 1949, p. 140-142.

Results of tests of carbon and graphite inserts in mold stools begun by Jones & Laughlin Steel Corp. in June 1944. It was found that inserts increase stool life and practically eliminate stool stickers.

2B-274. Quality of Oxygen-Decarbonized Acid Electric Steel. Charles A. Faist and Clyde Wyman. *Journal of Metals* (News Section), v. 1, Oct. 1949, p. 18-27.

Variables comprising acid electric practice as they influence quality and economics.

2B-275. Improvement of Machinability in High Phosphorus Gray Cast Iron. William W. Austin, Jr. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 431-444; discussion, p. 444-445.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-21. See item 2b-79, 1948.

2B-276. New Methods of Ladle Desulphurising Pig Iron. W. C. Newell, A. J. Langner, and J. W. Parsons. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A166-A170; discussion, p. A170-A172.

Previously abstracted from *Foundry Trade Journal*. See item 2b-153, 1948.

2B-277. Research and Quality in the Steel Industry. Charles M. Parker. *Iron Age*, v. 164, Oct. 6, 1949, p. 99-104.

Various phases of steelmaking are explored from the standpoint of existing problems and research done to overcome the difficulties. Instrumentation and mechanization developments. Coal cleaning, ore sintering and agglomeration, removal of sulfur from raw materials, new refractories, use of oxygen, and other developments.

2B-278. Uber das Erschmelzen von Roheisen im Kokshochofen und dessen Entschwefelung mittels Soda. (Melting of Pig Iron in the Coke Blast Furnace and Its Desulfurization by Means of Soda.) Karl Suresch. *Chemische Technik*, v. 1, July 1949, p. 23-27.

Acid smelting, the conversion to basic melting, and a modern method of desulfurization of pig iron outside the blast furnace by blowing soda against the flowing melt. 17 ref.

2B-279. (Book) Some Fundamental Problems in the Manufacture of Steel by the Acid Open Hearth and the Acid Electric Processes. *Acid Open Hearth Research Association*, Bulletin No. 2, 72 pages. Acid Open Hearth Research Association, P. O. Box 1873, Pittsburgh. $1.00.

Introductory statement plus the following reprinted papers (all previously abstracted): "Some Fundamental Problems in the Manufacture of Steel by the Acid Open Hearth Process", G. R. Fitterer, *Transactions of the American Society for Metals*, v. 34, 1945, p. 1-30; "Acid Electric Slags", G. R. Fitterer, *Electric Furnace Steel Proceedings* (AIME), v. 4, 1946, p. 185-198; "Control of Acid Open Hearth Heats Through Measurements of Slag Fluidity", James

W. Linhart, *Open Hearth Proceedings* (AIME), v. 29, 1946, p. 299-308; "A Comparison of the Pt-PtRh Thermocouple With the Optical Pyrometer for Temperature Measurements in Liquid Steel", G. R. Fitterer and J. W. Linhart, *Open Hearth Proceedings* (AIME), v. 30, 1947, p. 289-297; and "The Relation of Acid Open-Hearth Furnace Efficiency to Practice", G. R. Fitterer, J. G. Bassett, and J. B. Kopec, *Open Hearth Proceedings* (AIME), v. 31, 1948, p. 307-317.

2C—Nonferrous

2C-78. Production of Ductile Titanium at Boulder City, Nev. F. S. Wartman, J. P. Walker, H. C. Fuller, M. A. Cook, and E. L. Anderson. *U. S. Bureau of Mines, Report of Investigations* 4519, Aug. 1949, 37 pages.

Production of ductile-grade Ti powder in 100-lb. batches by reduction of purified titanic chloride with Mg, followed by grinding, leaching, and magnetic separation of the reaction product. Apparatus, technique, methods of controlling product quality, and some data on operating costs. 10 ref.

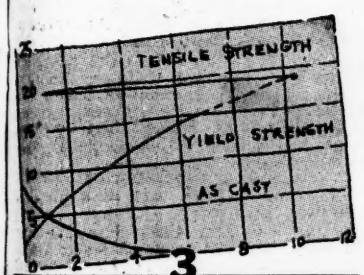
2C-79. A Decade of Electrolytic Manganese. Russell H. Bennett. *Engineering and Mining Journal*, v. 150, Oct. 1949, p. 80-84.

Includes a flowsheet of the electrowinning process. Economic factors and their bearing on the future of the process.

2C-80. Recent Progress in the Metallurgy of Malleable Zirconium. W. J. Kroll, A. W. Schlechten, W. R. Carmody, L. A. Yerkes, H. P. Holmes, and H. L. Gilbert. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 99-113.

Previously abstracted from Preprint 92-16. See item 2-263, 1947.

For additional annotations indexed in other sections, see: 15-65; 16C-13



3 PROPERTIES

3A—General

3A-197. On the Extrapolation of Short-Time Stress-Rupture Data. Nicholas J. Grant and Albert G. Bucklin. *American Society for Metals*, Preprint No. 18, 1949, 33 pages.

A large number of stress-rupture tests was made on alloy S-590 at 1200-1900° F. and on S-816 at 1200-1500° F. Rupture times varied from 3 sec. to 26,000 hr. The validity of straight lines in the log-log and semi-log plots of stress vs. rupture time and of stress vs. minimum creep rate is examined on the basis of these tests. Suggests method for predicting long-time performance or performance at other temperatures based on extrapolation of instability points clearly shown in log-log plots of rupture data. Data are analyzed on the basis of the chemical rate process theory. A value of "true elongation" is determined from stress-rupture tests, which appears to establish ductility changes as a function of increasing time or decreasing strain rate at a given temperature.

3A-198. The Behaviour of Metals Under Multiaxial Stress Systems. A. E. Johnson. *Aircraft Engineering*, v. 21, Sept. 1949, p. 284-286.

Mathematical analysis of the relationship between the applied tensile or direct stress and the torsion or shear stress.

3A-199. On the Gyromagnetic Ratio and Spectroscopic Splitting Factor of Ferromagnetic Substances. Charles Kittel. *Physical Review*, ser. 2, v. 76, Sept. 15, 1949, p. 743-748.

Discusses the connection between the results of microwave resonance-absorption experiments and gyromagnetic-ratio experiments. Review of experimental data indicates considerable variances between the two methods. 26 ref.

3A-200. Temperature and Metals. Notes on the Effect of Temperature on Certain Properties of Metals with Particular Reference to Creep. (Continued.) F. C. Lea. *Edgar Allen News*, v. 28, Aug. 1949, p. 354-356.

3A-201. On Grüneisen's Constant for Metals. Al Kónya. *Journal of Chemical Physics*, v. 17, Sept. 1949, p. 836.

Based on the theory developed by P. Gombás, an equation for theoretical determination of the above constant is developed. Compares experimental and theoretical data for Na, K, Rb, Cs, Mg, Ca, Sr, and Ba.

3A-202. Reviews of Certain Aspects of Metal Physics. Part III. The Principal Work in Ferromagnetism Since About 1938. W. Sucksmith. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 51-60.

One of a series of critical surveys. 105 ref.

3A-203. Contribution to the Theory of Alloys. (In Russian.) N. S. Akulov. *Doklady Akademiĭ Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 21, 1949, p. 361-364.

A mathematical analysis with particular emphasis on the relationship of the properties of each atom of the crystal to the number and characteristics of the surrounding atoms. This relationship corresponds to that of the magnetic saturation of alloys to the concentration of alloy components.

3A-204. Addendum: Heat Flow in Metals Below 1° K. and a New Method for Magnetic Cooling. J. G. Daunt and C. V. Heer. *Physical Review*, v. 76, Oct. 1, 1949, p. 985-986.

Heat pump for transferring heat from bath maintained at below 1° K. to a high-temperature bath, say 1° K.

3A-205. Deltamax: "The Metal With a Brain". W. S. Spring. *Steel Horizons*, v. 11, Fall 1949, p. 16-18.

See abstract from *Iron Age*, item 3A-77, 1949.

3A-206. Reduktion der Thermokräfte auf ideale Reinheit der Metalle. (Derivation of Thermal Electromotive Forces for "Completely" Pure Metals.) Max Kohler. *Zeitschrift für Physik*, v. 126, July 15, 1949, p. 481-494.

A formula for calculating the effects of impurities in a metal on thermoelectric forces, thus making it possible to determine constants for "completely" pure metal. Analogous conditions for the Thomson and Peltier effect, and general statements on the temperature dependence of thermoelectric phenomena and a comparison of computed with experimental results. 24 ref.

3A-207. Magnetische Legierungen hoher Permeabilitätskonstanz. (Magnetic Alloys of High Permeability Constancy.) K. Sixtus. *Physikalische Blätter*, v. 5, no. 2, 1949, p. 64-66.

The importance of above in a.c. circuits and composition and treatment of a low-Ni alloy which is an effective substitute for more expensive high-Ni alloys.

3A-208. Berechnung der Verformungsarbeit von Metallen bei gewöhnlicher und schlagartiger Zugbeanspruchung. (Computing the Stress of Deformation of Metals Under Usual and Impact-Type Tensile Stresses.) Albert Kochendörfer. *Zeitschrift für Metallkunde*, v. 39, Dec. 1948, p. 376-384.

The true stress-strain curve for face-centered metals and for body-centered ferrous metals is approximated by a parabola. The dependence of expansion-curve indices on temperature and rate of stress application. Method of computing deformation stresses is demonstrated and theoretical results are compared with experimental ones. 16 ref.

3B—Ferrous

3B-194. Tensile Properties of a Heat Treated Low Alloy Steel at Subzero Temperatures. E. J. Ripling. *American Society for Metals*, Preprint No. 1, 1949, 14 pages.

Specimens of SAE 1340 were tempered at various temperatures between room temperature and 1100° F. Fracturing characteristics were plotted vs. testing temperature for the different tempering temperatures. Specimens tempered between 300 and 700° F. gave curves typical of materials with a transition temperature. Higher and lower temperatures gave almost linear relationships. 12 ref.

3B-195. Unnotched Impact Strength of High Speed Steels. Arthur H. Grobe and George A. Roberts. *American Society for Metals*, Preprint No. 4, 1949, 23 pages.

Unnotched Izod impact tests were conducted on nine different commercially available high speed steels and results compared with those obtained in the bend test of one of the steels.

3B-196. Effect of Boron and Kind of Boron Addition Upon the Properties of Steel. R. A. Grange, W. B. Seens, W. S. Holt, and T. M. Garvey. *American Society for Metals*, Preprint No. 5, 1949, 33 pages.

Samples from selected locations throughout each of 13 large commercial heats comprising AISI 1046, 1321, and 4150 grades of steel were investigated to determine the effect of boron, and kind of ferro-alloy in which it was added, upon uniformity of boron distribution, hardenability, austenite grain coarsening, susceptibility to temper embrittlement, and tensile and impact properties in each of several heat treated conditions.

3B-197. Characteristics and Properties of Cast Low Chromium-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *American Society for Metals*, Preprint No. 6, 31 pages.

Some low-chromium-molybdenum cast steels recommended for their resistance to graphitization in superheated steam service were investigated for thermal characteristics, microstructures, physical properties, and weldability. 51 ref.

3B-198. Iron-Manganese and Iron-Manganese-Nickel Alloys. Irvin R. Kramer, Stewart L. Toleman, and Walter T. Haswell. *American Society for Metals*, Preprint No. 7, 1949, 33 pages.

Thermal and mechanical behavior of a series of these alloys was studied in order to develop alloys which,

when slowly cooled from the austenitizing temperature, have strength and ductility properties equivalent to those of quenched and tempered steel. Additions of nickel stabilize the austenite so that this goal can be achieved. Behavior on tempering can be used to explain some of the embrittling effects which occur during the tempering of commercial steel.

3B-199. Metallurgical Factors Affecting the Magnetic and Mechanical Properties of Iron-Cobalt Alloys. J. K. Stanley. *American Society for Metals*, Preprint No. 8, 1949, 22 pages.

Metallurgical factors such as impurities (carbon and oxygen), grain size, and order-disorder were investigated with respect to magnetic quality and fabrication of 35-50% Co iron alloys. 14 ref.

3B-200. Stability of AISI Alloy Steels at Elevated Temperatures. A. B. Wilder and J. O. Light. *American Society for Metals*, Preprint No. 17, 1949, 19 pages.

Stability of over 100 different types at 900, 1050 and 1200° F. is being evaluated over a period of 10 years. Results obtained in an examination of 16 of these steels for evidence of structural changes, oxidation characteristics, and impact properties after exposure for 10,000 hr.

3B-201. Influence of Composition on Temper Brittleness in Alloy Steels. A. P. Taber, J. F. Thorlin, and J. F. Wallace. *American Society for Metals*, Preprint No. 22, 1949, 25 pages.

Effects of various amounts of Cr, Mn, Ni, and Mo in low and medium-alloy steels were determined. Significant variables, such as grain size, hardness, microstructure, steelmaking practice, forging direction and reduction, tempering temperature, and method of embrittlement were maintained as constant as possible. To attain maximum hardenability with the minimum temper brittleness, use of a steel containing at least 0.60-0.70% Mn and 0.25% Mo appears desirable. Combinations of Mn, Cr, and Ni seem preferable for higher hardenabilities. 19 ref.

3B-202. Creep and Rupture of Several Chromium-Nickel Austenitic Stainless Steels. G. V. Smith, E. J. Dulis, and E. G. Houston. *American Society for Metals*, Preprint No. 25, 1949, 46 pages.

AISI types 304, 316, 321, and 347 were investigated at 1100, 1300, and 1500° F. The nature of the microstructural changes occurring during test, the effect of these on certain mechanical properties, and the mode of fracture. 16 ref.

3B-203. The Effect of Sigma Phase on the Short-Time High-Temperature Properties of 25 Chromium, 20 Nickel Stainless Steel. Glen J. Guarnieri, James Miller, and Frank J. Vawter. *American Society for Metals*, Preprint No. 26, 1949, 22 pages.

Using a 25% Cr, 20% Ni stainless steel with 2% Si, high-temperature tensile and creep properties (up to 100-hr. duration) were correlated with type and pattern of sigma distribution. The hard sigma-phase constituent was found to increase materially the tensile and yield strength properties of the Cr-Ni steel up to approximately 1400° F., but a corresponding decrease in long-time creep strength properties occurred. The finely divided type of sigma structure was found desirable for minimizing room-temperature embrittlement as indicated by bend tests.

3B-204. A Study With New Equipment of the Effects of Fatigue Stress on the Damping Capacity and Elasticity of Mild Steel. B. J. Lazan. *American Society for Metals*, Preprint No. 28, 1949, 52 pages.

One of two new dynamic testing machines for damping measurements at high stress levels is a rotating cantilever beam machine. Test data indicate changes in capacity and dynamic modulus of elasticity of hot rolled mild steel during fatigue test. Two newly introduced terms, cyclic stress sensitivity and ultimate cyclic stress sensitivity, are used in analysis of dynamic ductility or notch-sensitivity concepts and fatigue specimen form factors. Exploratory tests on variable stress histories, overloading, underloading, rest, speed, and other variables. 17 ref.

3B-205. Bolted Joints Under Fatigue Loads. K. H. Lenzen. *Fasteners*, v. 6, no. 1, 1949, p. 6-9.

Fatigue tests. It was found that joints subjected to fully reversed cycles of fatigue loading may have unusually high fatigue strength.

3B-206. Magnetic Properties of Cast Stainless Steel. E. A. Schoefer. *Alloy Casting Bulletin*, no. 13, Aug. 1949, p. 1-4, 6.

Various cast alloy types, and reasons for their differences from wrought compositions. Shows that corrosion resistance is not a function of magnetic properties.

3B-207. Wrought Stainless Steels—Martensitic Type. *Materials & Methods*, v. 30, Sept. 1949, p. 93, 95.

Compositions; physical, mechanical, and fabricating properties; thermal treatments, corrosion resistance, available forms, and uses. A tabulation.

3B-208. Free Machining Steels—A Report on Ductility and Impact Resistance. W. Lee Williams. *Journal of the American Society of Naval Engineers*, v. 61, Aug. 1949, p. 543-553.

Experimental work on ductility and critical impact (embrittling) temperatures when steel is stressed in the direction of rolling. The first phase pertained to the study of nearly all types of commercially produced free-machining steels, treated as a general class, to determine whether sulfur and phosphorus are among the predominant influences on ductility and impact resistance. The second phase consisted of a study of three series of steels in which all known variables were held constant while the sulfur contents were changed.

3B-209. The Hot Tearing of Steel; A Review. J. M. Middleton. *Iron and Steel*, v. 22, Sept. 1949, p. 407-411.

Hot tearing occurs during casting of metals in the foundry and also in ingot casting. Causes, factors affecting this phenomenon and methods of testing for hot-tear susceptibility. 27 ref.

3B-210. Creep and Relaxation of Metals at High Temperatures. *Engineering*, v. 168, Sept. 2, 1949, p. 237-239. Condensed from "The Relaxation of a Chrome-Molybdenum Bolt Steel at Elevated Temperatures", and "The Relaxation of Two Low-Carbon Steels at Elevated Temperatures", both by A. E. Johnson, *British Electrical and Allied Industries Research Association*, Reports J/T144 and 145, 1949.

Analyzes effects of some of the factors which might influence creep at high temperatures. Validity of the analysis was checked against the results of relaxation and normal creep tests carried out at National Physical Laboratory, at temperatures up to 525° C. for periods up to nearly two years. Results indicate that, within the range of conditions applied, normal creep properties should not be used to predict relaxation characteristics; and that the time and strain hardening theories of creep considered are not entirely satisfactory.

3B-211. Kristallographische Vorgänge an der Fliessgrenze von Stahl und ihre Bedeutung für die Dauerfestigkeit. (Crystallographic Behavior at the Yield Point of Steel and Its Relationship to Fatigue Strength.) Franz Lihl. *Metall*, Dec. 1948, p. 391-396; Feb. 1949, p. 49-51.

Experiments made to determine the effect of fatigue stresses on the structure of steel. X-ray diagrams, tables, and graphs. 10 ref. (To be concluded.)

3B-212. Aciers ferritiques pour turbines à gaz. (Ferritic Steel for Gas Turbines.) G. Wood and J. R. Rait. *Revue de Métallurgie*, v. 46, June 1949, p. 386-398.

A series of alloy steels was comparatively investigated, including some austenitic steels. (To be continued.)

3B-213. A Laboratory Evaluation of Some Automotive Cast Irons. Arthur B. Shuck. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 166-192; discussion, p. 192-193.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-11. See item 3b-59, 1948.

3B-214. Pearlitic Malleable Irons, Plain and Alloyed. Richard Schneidewind and D. J. Reese. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 410-429; discussion, p. 429-430.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-49. See item 3b-60, 1948.

3B-215. Tensile Properties vs. Composition of Double Normalized Cast Steel. H. A. Schwartz and W. K. Bock. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 446-451; discussion, p. 451.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-1. See item 3b-57, 1948.

3B-216. Effect of the Common Alloying Elements on the Tensile Properties of Malleable Iron. H. A. Schwartz and W. K. Bock. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 458-461; discussion, p. 461.

See abstract from *American Foundryman*, item 3b-66, 1948.

3B-217. Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable. H. A. Schwartz. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A21-A28.

See abstract from *American Foundryman*, item 3b-83, 1948.

3B-218. Plastic Flow in Cast Iron, at Room and Elevated Temperatures, With Special Reference to Relief of Stress. C. R. Tottle. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A67-A72; discussion, p. A73-A75.

Previously abstracted from *Foundry Trade Journal*. See item 3b-201, 1948.

3B-219. Effect of Chromium Plating on the Endurance Limit of Steels Used in Aircraft. Hugh L. Logan. *Journal of Research of the National Bureau of Standards*, v. 43, Aug. 1949, p. 101-112.

Cr plating reduced endurance limits of both normalized and hardened SAE X4130 steels; reduction was larger for the hardened steel. Endurance limits for steel of given hardness decreased with increased plating-bath temperatures. Baking at temperatures up to 350° C. reduced the endurance limit; baking at 440° C. increased the limit for plated steel. Damaging effects of Cr are attributed to stresses which are increased by low-temperature baking, but are relieved in part by baking at 400-440° C. 14 ref.

3B-220. Influence of Strain Rate and Temperature on the Creep of Cold-Drawn Ingot Iron. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards*, v. 43, Aug. 1949, p. 117-131.

Results of a similar study for Monel and oxygen free high-purity copper were previously reported.

since Monel and copper are face-centered cubic metals, the program was extended to include a study of the behavior of body-centered cubic iron as affected by variations in strain rate and in temperature.

3B-221. Selection of Steel for Automobile Parts. What Engineers Should Know Today About Hardenability-Band Steels. Part III. Steel Composition Related to Hardenability. A. L. Boegehold. *SAE Journal*, v. 57, Oct. 1949, p. 33-38.

Also slide rules for calculating hardenability curves from chemical composition. (To be continued.)

3B-222. Common Alloy Steels. Their Characteristics & Uses. *SAE Journal*, v. 57, Oct. 1949, p. 51-53, 60.

Metallurgical properties of commonly-used alloy steels (excluding stainless and austenitic) as well as some of their applications.

3B-223. Notch Sensitivity of Mild Steel Plates. A. B. Bagsar. *Welding Journal*, v. 28, Oct. 1949, p. 484s-506s.

Characteristics of several open-hearth, rimmed, semikilled, and killed steels of structural and pressure-vessel qualities, in the form of plates ¼-2¼ in. thick, were evaluated by use of several types of notched-bar tests. On the basis of the results, simplified testing procedures for establishing notch-sensitivity characteristics.

3B-224. General Engineering Types of Steel Castings Classified According to Tensile Strengths. *Tool Engineer*, v. 23, Oct. 1949, p. 38-39.

3B-225. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2115-2120.

Anhysteretic vs. normal magnetisation; and probability relationships.

3B-226. Einfluss von Sondernitriden auf die Eigenschaften von wolframarmen Schnellarbeitsstählen. (Effect of Special Nitrides on the Properties of Low-Tungsten High-Speed Toolsteels.) Franz Rapatz and Josef Frehser. *Stahl und Eisen*, v. 69, Aug. 18, 1949, p. 605-607.

Experiments with seven different steels show that the nitrides of Al, Zr, or Ti increase retention of hardness and, hence, life of toolsteels by 70-80%. 12 ref.

3B-227. (Book) Hardenability and Steel Selection. Walter Crafts and John L. Lamont. 260 pages. 1949. Pitman Publishing Corp., 2 W. 45th St., New York. $5.50.

Coordinated pattern of hardenability theories and calculations responsible for steel being purchased by hardenability instead of by chemical composition.

3C—Nonferrous

3C-190. Fabrication and Mechanical Properties of Ductile Zirconium. E. T. Hayes, E. D. Dilling, and A. H. Roberson. *American Society for Metals*, Preprint No. 32, 1949, 24 pages.

Properties of ductile Zr produced by magnesium reduction of zirconium chloride were determined on sheet produced by forging and rolling 10-lb. ingots in air at 650° C. or sheath-protected at 850° C. Optimum annealing conditions for 50% cold worked material. Ductile zirconium can be forged, swaged, rolled, drawn, and stamped, using conventional fabricating equipment. Hardness of Zr from −190 to 600° C., impact strength in the same temperature range, ultimate strength and elongation at −190° C., minimum bend radius for annealed and cold worked sheet, and resistivity of rod and wire. 19 ref.

3C-191. Titanium, Fact Versus Fancy. N. S. Spence. *Modern Metals*, v. 5, Sept. 1949, p. 15-17.

History, properties, economy and future.

3C-192. Some Properties of Superconductors Below 1° K. I. Titanium. J. G. Daunt and C. V. Heer. *Physical Review*, ser. 2, v. 76, Sept. 15, 1949, p. 715-717.

Magnetic measurements on Ti of 99.95% purity were carried out down to 0.3° K. It was found to be superconductive with a transition temperature of 0.53° K. Measurements of the magnetic threshold curve were made. 17 ref.

3C-193. Heat Flow in Metals Below 1° K and a New Method for Magnetic Cooling. C. V. Heer and J. G. Daunt. *Physical Review*, ser. 2, v. 76, Sept. 15, 1949, p. 854-855.

Measurements were made of the thermal conductivities of Sn and Ta both in the superconducting and normal states from 0.2 to 1° K. Experiments on thermal contact by heat flow through superconductors in this temperature range. Preliminary results.

3C-194. Measurements on the Negative Temperature Coefficient of Nickel Films. (In English.) A. Van Itterbeek, L. De Greve, and R. Celis. *Physica*, v. 15, July 1949, p. 433-436.

Influence of the gases A, He, Ne, H_2, and N_2 on variations of electrical conductivity with temperature.

3C-195. Thermal and Electrical Resistance of a Tungsten Single Crystal at Low Temperatures and in High Magnetic Fields. (In English.) J. De Nobel. *Physica*, v. 15, July 1949, p. 532-540.

Experiments made in order to determine whether the law of Wiedermann-Franz holds for the electrical and thermal conductivity due to electrons show that this law is not valid in stronger fields.

3C-196. Nuclear Magnetic Relaxation in Metallic Copper. (In English.) N. Bloembergen. *Physica*, v. 15, July 1949, p. 588-592.

The method of nuclear magnetic resonance absorption was used to measure relaxation time and line width of the resonance of the copper spins in metallic copper. 11 ref.

3C-197. Sur la variation du moment et du point de Curie du palladium hydrogéné. (Variation of Moment and of Curie Point of Hydrogenated Palladium.) Jules Wucher. *Comptes Rendus* (France), v. 229, July 18, 1949, p. 175-177.

Magnetic moment and Curie point were studied for 0.1-mm. sheet and 0.5-mm. wire between −70 and 200° C.

3C-198. Conduction Processes in Thin Deposits of Antimony. Louis Harris and Lloyd H. Shaffer. *Physical Review*, v. 76, Oct. 1, 1949, p. 943-945.

Sublimed deposits having a resistivity 1.35 times massive resistivity were prepared. Assuming two conduction processes in Sb, the mean free paths for the processes in thin sublimed deposits were found to be 1725 A and 666 A. The trapping of electrons in the surface becomes important for thicknesses less than 1000 A, which supports the concept of surface electronic states in metals. 18 ref.

3C-199. Current Densities in the Cathode Spots of Transient Arcs. J. M. Somerville and W. R. Blevin. *Physical Review*, v. 76, Oct. 1, 1949, p. 982.

Spots produced by high current arcs of short duration in air at atmospheric pressure on Al, Cu, Mg, Ni, Sn, and W cathodes. In arcs of short duration current densities of the order of 10^8 amp. per sq.cm. may prevail.

3C-200. Less Common Metals. H. H. Uhlig and D. B. Broughton. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2153-2154.

Reviews recent publications on Ti, Zr, Ta, Mo, Au, Pt, and Ag covering for the most part properties and applications. 67 ref.

3C-201. Specific Heat of Beryllium Between 0° and 900° C. D. C. Ginnings, T. B. Douglas, and Anne F. Ball. *U. S. Atomic Energy Commission*, AECD-2657, June 16, 1949, 12 pages.

11 references.

3C-202. Influence of Temperature on the Stress-Strain-Energy Relationship for Copper and Nickel-Copper Alloy. D. J. McAdam, Jr. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 727-740.

Results derived from tension tests of unnotched cylindrical specimens of monel and oxygen-free Cu at strain rates a little slower than those ordinarily used in tension tests and at temperatures of −188 to +165° C. 23 ref.

3C-203. Observations on the Failure of 80 Nickel, 20 Chromium Alloy at Excessive Temperatures. H. D. Holler, *Transactions of the Electrochemical Society*, v. 92, 1947, p. 91-97.

Previously abstracted from Preprint 92-7. See item 3-361, 1947.

3C-204. Penetration of Magnetic Field Into Superconductors. II. Measurements by the Casimir Method. E. Laurmann and D. Shoenberg. *Proceedings of the Royal Society*, ser. A, v. 198, Sept. 7, 1949, p. 560-581.

Changes with temperature of penetration of a magnetic field into superconducting Sn and Ag were studied by the above method in which a mutual inductance with a superconducting core is measured using low-frequency currents. The results were found to be very sensitive to surface conditions, but single crystals with smooth surfaces gave reproducible measurements. 18 ref.

3C-205. Surface Effect and Structure of Single Crystal Wires. E. N. da C. Andrade. *Nature*, v. 164, Sept. 24, 1949, p. 536-537.

A few months ago Randall and the author reported on the effect of certain electrolytes applied at the surface, on the flow of cadmium single crystals. Subsequent work with wires heated in vacuum, with consequent formation of a really clean surface, modifies considerably the effects previously reported. Cd sulfate and chloride have no effect on flow, but the nitrate produces the same hardening effect as before.

3C-206. Über eine thermische Anomalie der technischen Widerstandslegierung "Isabellin". (A Thermal Anomaly of the Commercial Resistance Alloy "Isabellin".) Otto Heusler. *Zeitschrift für Metallkunde*, v. 39, Nov. 1948, p. 326-333.

Above alloy (83% Cu, 12% Mn, 3% Al, and small amounts of Fe, Si, and P) was found to possess large temperature hysteresis, especially of electrical resistance and thermal expansion. G. Masing's proposed explanation of solidification of a thermally conditioned lattice distortion. 12 ref.

3C-207. Untersuchungen zur plastischen Deformation an Kupferdraht. (Research on Plastic Deformation of Copper Wire.) Doris Kuhlmann and Georg Masing. *Zeitschrift für Metallkunde*, v. 39, Dec. 1948, p. 361-375.

Reviews literature and describes experiments made to determine the isothermal torsional flow of different Cu wire coils or springs. Results and apparatus. 26 ref.

3D—Light Metals

3D-65. Effect of Steady Stress on Fatigue Behavior of Aluminum. J. A. Sauer and D. C. Lemmon. *American*

Society for Metals, Preprint No. 29, 1949, 18 pages.

Fatigue behavior, under alternating bending and alternating torsion of 14S-T; in particular, the effect of static mean stress on fatigue strength. 10 ref.

3D-66. Magnesium Alloy Developments. *Modern Metals*, v. 5, Sept. 1949, p. 20.

Effects of adding Zn, Zr, Ce, and Mn on properties of Mg alloys.

3D-67. New Departure Discusses Ball Bearing Mountings in Aluminum Housings. *Modern Metals*, v. 5, Sept. 1949, p. 26-27.

Fit and standard bearing tolerances. Favorable qualities of Al for machine parts, and ways to circumvent its less desirable qualities. Five types of housing lines; guild saw equipped with New Departure ball bearings.

3D-68. How To Use High-Strength Aluminum Alloy. E. C. Hartmann, F. M. Howell, and R. L. Templin. *Aviation Week*, v. 51, Oct. 10, 1949, p. 21-22, 24-25, 27-28, 33-34, 38.

Mechanical properties and test methods. 31 ref.

3D-69. Honeycomb-Sandwich Structures. II. H. C. Engel and T. P. Pajak. *Product Engineering*, v. 20, Oct. 1949, p. 131-134.

Effects of environment conditions on the physical properties of Al and fabric core of sandwich structures. Acoustical and heat insulation properties that show promise for engineering application.

3D-70. Aluminum-Zinc-Magnesium-Copper Casting Alloys. L. W. Eastwood and L. W. Kempf. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 100-111; discussion, p. 112-115.

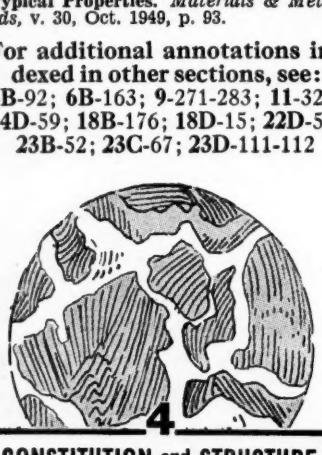
Previously abstracted from *American Foundrymen's Association*, Preprint 48-12. See item 3d-21, 1948.

3D-71. Effect of Titanium on Grain Size and Tensile Properties of an Aluminum, 4.5 Per Cent Copper (No. 195) Casting Alloy. W. E. Sicha and R. C. Boehm. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 398-408; discussion, p. 408-409.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-16. See item 3d-22, 1948.

3D-72. Magnesium Casting Alloys: Typical Properties. *Materials & Methods*, v. 30, Oct. 1949, p. 93.

For additional annotations indexed in other sections, see: 4B-92; 6B-163; 9-271-283; 11-326; 14D-59; 18B-176; 18D-15; 22D-57; 23B-52; 23C-67; 23D-111-112



CONSTITUTION and STRUCTURE

4A—General

4A-112. The Dislocation Theory of Slip. Recent Developments in Britain. F. R. N. Nabarro. *Metallurgia*, v. 40, Aug. 1949, p. 199-205.

Movement of dislocations, transient creep, multiplication of dislocations, solid solutions and precipitation hardening, the bubble model, and interaction of dislocations and dissolved atoms. 19 ref.

4A-113. Interpretation of X-Ray Patterns of Cold-Worked Metal. B. L. Averbach and B. E. Warren. *Journal of Applied Physics*, v. 20, Sept. 1949, p. 885-886.

Experimental technique which makes it possible to measure the shape of a powder pattern line with sufficient accuracy to justify an interpretation based on the shape rather than using just the line breadth.

4A-114. Transitions in Solids and Liquids. L. A. K. Staveley. *Quarterly Reviews*, v. 3, no. 1, 1949, p. 65-81.

Critical review of theory applicable to substances of widely different chemical types, including condensed gases, salts, and alloys. 61 ref.

4A-115. Secondary Recrystallization of Face-Centered Ni-Fe Alloys. G. W. Rathenau and J. F. H. Custers. *Philips Research Reports*, v. 4, Aug. 1949, p. 241-260.

Results of a study of the various orientations found in secondary-recrystallization structures. Normal secondary recrystallization is indicated to be the grain growth of primary crystals with a high temperature of primary recrystallization. The influence of sheet thickness and of gas atmosphere on secondary recrystallization. 14 ref.

4A-116. Comparison of the Perfection of the Crystals of Primary and Secondary Recrystallization. A. Guinier and J. Tennevin. *Philips Research Reports*, v. 4, Aug. 1949, p. 316-318.

The perfection of primary and secondary crystals of Ni-Fe alloys was studied by an X-ray method which allows measurement of deviations of the normals of lattice planes with an accuracy of ¼ min.

4A-117. Über die Teilchengrösse und den Gleitebenenabstand in plastisch verformten Kristallen. (Concerning Particle Sizes and the Slip-Plane Interval in Plastically Deformed Crystals.) Albert Kochendörfer. *Zeitschrift für Metallkunde*, v. 39, Nov. 1948, p. 359-360.

Points out that electron-optically measured slip-plane intervals agree with particle sizes determined by X-rays, agreeing with the assumption that the lattice distortions in the slip planes interrupt the X-ray optical coherence. The light microscope reveals the slip lines only as individual lines at an interval of 1 μ. 11 ref.

4B—Ferrous

4B-92. Relationship of Inclusion Content and Transverse Ductility of a Chromium-Nickel-Molybdenum Gun Steel. John Welchner and Walter G. Hildorf. *American Society for Metals*, Preprint No. 2, 1949, 19 pages.

Average rating per heat of steel versus reduction of area transverse. Both quantity and type of inclusions are considered for average as well as individual specimen comparisons. The manner in which the final product to be manufactured affects the results.

4B-93. The Effect of Vanadium and Carbon on the Constitution of High Speed Steel. Donald J. Blickwede, Morris Cohen, and George A. Roberts. *American Society for Metals*, Preprint No. 3, 1949, 32 pages.

Constitution of 6% W, 5% Mo, 4% Cr high speed steel was studied as a function of V, C, and temperature. The principal methods consisted of electrolytic extraction, chemical analysis, X-ray diffraction, and quantitative metallography. Limitations on range of potentially useful compositions are discussed. 21 ref.

4B-94. Measurement of Retained Austenite in Carbon Steels. B. L. Averbach, L. S. Castleman, and M. Cohen. *American Society for Metals*, Preprint No. 20, 1949, 10 pages.

An X-ray method previously applied to toolsteels was extended to low and medium-carbon steels. Measurable quantities of austenite were found in a series of quenched plain-carbon steels (both refrigerated and nonrefrigerated) containing 0.20-1.07% C.

4B-95. Fractographic Study of Deformation and Cleavage in Ingot Iron. C. A. Zapffe and C. O. Worden. *American Society for Metals*, Preprint No. 31, 1949, 27 pages.

Fracture facets of ingot iron were studied fractographically in a preliminary investigation of deformation and cleavage phenomena as expressed in cleavage patterns of iron. The patterns proved to be characteristic, reproducible, and informative, expressing features of original crystal growth, mechanical, thermal, and chemical treatment, and perhaps of recrystallization in annealed specimens. Effects of cold working and hydrogen embrittlement. Two new fractographic techniques. 20 ref.

4B-96. Electron Microscope Study of Quenched and Tempered Steel. J. Trotter and D. McLean. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 9-13.

Changes occurring during the tempering of a 0.6% C steel quenched to martensite were studied. Separate specimens were used for each tempering temperature and the series was examined with three different etching reagents. The electron microscope gave 5-10 times the resolution of the optical microscope. Observations are interpreted. 13 ref.

4B-97. An Investigation on Banding. J. D. Lavender and F. W. Jones. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 14-17.

Segregation in several steels was studied by microradiographic methods. Temperatures of the order of 1200-1350° C. were required to remove banding, in agreement with rough calculations based upon diffusion data. The relation between microradiographic and metallographic results.

4B-98. New Graphite Nodulizing Alloy Developed by Naval Research Laboratory. E. T. Myskowski and R. P. Dunphy. *Foundry*, v. 77, Oct. 1949, p. 72-75.

Experimental results in use of an Fe-Si-Mg alloy to produce nodular graphite in cast iron. It eliminates necessity for a separate inoculating treatment following the nodulizing addition.

4B-99. Size Effects in Quenching High-Purity, Precipitation Hardenable Alloys. Walter L. Finlay. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 668-674.

Size effects are believed to result from thermal fluctuations which occur in quenching a specimen of finite size into a cooling liquid rather than from the existence of a critical cooling rate. 17 ref.

4B-100. Discontinuous Crack Propagation. Further Studies. L. D. Jaffe, E. L. Reed, and H. C. Mann. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 683-687.

Impact test specimens, service fractures, and fatigue specimens of steel were observed. Results are discussed. 12 ref.

4B-101. The Free Energy Change Accompanying the Martensite Transformation in Steels. J. C. Fisher. *Journal*

of Metals (Technical Section), v. 1, Oct. 1949, p. 688-690.

Influence of temperature and composition. 10 ref.

4B-102. Kinetics of the Austenite-Martensite Transformation. J. C. Fisher, J. H. Hollomon, and D. Turnbull. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 691-700.

Nucleation in single component systems, and in the two-component Fe-C system. M, temperatures and transformation curves are calculated for several alloy steels of varying C and Cr content, and are compared with those determined experimentally by other authors. 28 ref.

4B-103. On the Problem of Grain Boundary Movement. C. G. Dunn, F. W. Daniels, and M. J. Bolton. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 708-709.

Observations on grain boundary movements in silicon iron indicated the possibility of studying grain growth phenomena in two-grain specimens. Technique which permits time-temperature investigation at constant curvature. Also, the rate of grain boundary movement can be measured as a function of temperature alone and results used to calculate activation energies.

4B-104. The Diffusion and Solubility of Carbon in Alpha Iron. James K. Stanley. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 752-76[illegible].

Reviews the literature. The Van Orstrand-Dewey method and the Grube method. 36 ref.

4B-105. Influence of Chromium on Graphitization of White Cast Iron. Gabriel Joly. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 66-70; discussion, p. 70-71.

Previously abstracted from *American Foundryman*. See item 4b-49, 1948.

4B-106. Production of Nodular Graphite Structures in Gray Cast Irons. H. Morrogh. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 72-87; discussion, p. 87-90.

Previously abstracted from *Journal of the Iron and Steel Institute*. See item 4b-27, 1948.

4B-107. Nodular Cast Irons, Their Production and Properties. H. Morrogh and J. W. Grant. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A29-A51; discussion, p. A51-A53.

Previously abstracted from *Foundry Trade Journal*. See items 4b-54 and 3b-128, 1948.

4B-108. A Study of Residual Gases in Cast Iron. J. E. Hurst and R. V. Riley. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A54-A64; discussion, p. A64-A66.

Previously abstracted from *Foundry Trade Journal*. See item 4b-97, 1948.

4B-109. The Maurer Diagram and Its Evolution and a New Structural Diagram for Cast Iron. H. Laplanche. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A76-A93; discussion, p. A93-A94.

See abstract from *Metal Progress*, item 4-202, 1947.

4B-110. Carbides, Nitrides, and Carbonitrides of Iron. H. L. Riley. *Quarterly Reviews*, v. 3, no. 2, 1949, p. 160-172.

Crystal structure, phase transformations, and chemical reactions. 64 ref.

4B-111. Der Gefügetypus des Eisen-Kohlenstoff-Systems. (Structure Types in the Iron-Carbon System.) H. Klemm. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 265-271.

The metastable and stable structures of the Fe-C system normally occurring at room temperature and several typical structural phenomena, hardness structures, inclusions, and segregations. The Fe-C diagram and 22 photomicrographs.

4C—Nonferrous

4C-110. Microscopical Studies on the Iron-Nickel-Aluminium System. Part I. $\alpha + \beta$ Alloys and Isothermal Sections of the Phase Equilibrium Diagram. A. J. Bradley. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 19-30.

Results of a thorough investigation of all alloys containing less than 50 atomic % Al, using quenched microsections, from 1350 to 750° C., at temperature intervals of 100° C. Photomicrographs and ternary diagrams. 19 ref.

4C-111. Étude par le polissage électrolytique et les rayons X de la structure cristalline de rubans ferromagnétiques. (Study by Means of Electropolishing and X-Rays, of the Crystal Structure of Ferromagnetic Strips.) Jean Wyart and Israel Epelboin. *Comptes Rendus* (France), v. 229, July 25, 1949, p. 301-303.

Variation with depth of the crystal structure of two compositions (17% Fe, 76% Ni, 5% Cu, 1.5% Cr; and 22% Fe, 76% Ni, 1.5% Mn), differently heat treated, was investigated. Electropolishing was used to remove uniform layers a few microns thick. Procedure and results.

4C-112. Concerning "Thermoelastic" Equilibrium During the Martensite Transformation. (In Russian.) A. V. Kurdyumov and L. G. Khandros. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 11, 1949, p. 211-214.

Results of experiments indicate two new phenomena in the martensite transformation: slow transformation at low temperatures and presence of "elastic" crystals in the martensite phase. The first phenomenon has already been established and explained. Experiments on a Cu alloy containing 14.5% Al and 1.5% Ni between 10 and 20° C. prove the existence of the second phenomenon.

4C-113. The Ternary System, Copper-Manganese-Zinc. T. R. Graham, J. R. Long, C. E. Armantrout, and A. H. Robertson. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 675-682.

Solid phase boundaries of the system from the Cu-Zn binary to the Mn-Zn binary for alloys containing up to 50% Zn. Alloys were examined by metallographic methods including hardness and X-ray data for confirmation. Includes micrographs and isothermal sections of the ternary system at various temperatures. 15 ref.

4C-114. Some Observations in the Structure of Alpha Brass Single Crystals After Cutting and Polishing. Robert Maddin and Walter R. Hibbard, Jr. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 700-701.

4C-115. Stages in the Deformation of Monel Metal as Shown by Polarized Light. D. H. Woodard. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 722-726.

Inhomogeneous plastic deformation, which results in lattice bending and development of deformation bands experienced by individual grains in polycrystalline monel, is revealed in the microstructure. 13 ref.

4C-116. Kinetics of the Reactions of Titanium With O_2, N_2, and H_2. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 741-748.

Presents systematic study and correlates results with fundamental theories of gas-metal reactions. 48 ref.

4C-117. Structure of Diborides of Titanium, Zirconium, Columbium, Tantalum, and Vanadium. John T. Norton, H. Blumenthal, and S. J. Sindeband. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 749-751.

Preparation of samples and X-ray technique. Results of studies.

4C-118. Studies of Interface Energies in Some Aluminum and Copper Alloys. K. K. Ikeuye and Cyril Stanley Smith. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 762-768.

Experiments which show the effect of both composition and temperature on the dihedral angle and on the ratio of interphase and intercrystalline boundary energies for some alloys containing a liquid phase. Data on the rate of approach to the equilibrium angles in both solid and liquid phases.

4C-119. Effect of Small Quantities of Hydrogen and Grain-Size on the α-β Transformation of Titanium. A. D. McQuillan. *Nature*, v. 164, Sept. 24, 1949, p. 537.

4C-120. Reaktionen von Zink-Aluminium-Schmelzen mit festem Eisen. (Reactions of Zinc-Aluminum Melts With Solid Iron.) Erich Gebhardt and Irmgard Schmidt. *Zeitschrift für Metallkunde*, v. 39, Nov. 1948, p. 321-325.

The solubility of Armco iron in molten Zn-Al and Zn-Al-Cu alloys. The amounts of dissolved Fe were correlated with time of reaction and composition of the melts. Rates of reaction increased with Al content. Three different types of solvent attack. 14 ref.

4C-121. Das Dreistoffsystem Kupfer-Zink-Magnesium. (The Ternary Copper-Zinc-Magnesium System.) Werner Köster. *Zeitschrift für Metallkunde*, v. 39, Nov. 1948, p. 352-359.

Experimental results. Constitution diagrams and photomicrographs.

4C-122. Zur Kenntnis der dem Parkes-Verfahren zu Grunde liegenden Systeme. Die Systeme Blei-Zink sowie Wismut-Zink mit Silber und Kupfer. (Concerning Systems Based on the Parkes Process. The Lead-Zinc and Bismuth-Zinc Systems Containing Silver and Copper.) Ernst Henglein and Werner Köster. *Zeitschrift für Metallkunde*, v. 39, Dec. 1948, p. 391-400.

The Parkes process and experimentally determined equilibrium curves for the Pb-Ag-Zn, Pb-Cu-Zn, Bi-Ag-Zn, and Bi-Cu-Zn systems. Constitution diagrams of various related binary systems. 11 ref.

4D—Light Metals

4D-59. The Transverse Bending of Single Crystals of Aluminum. M. K. Yen and W. R. Hibbard, Jr. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 710-720.

Mode of testing, using the two-point loading method. Attention was given to both lattice distortion and flow characteristics during formation. 25 ref.

4D-60. Growth and Perfection of Beryllium Crystals. I. Growth of Large Beryllium Crystals by Solidification. II. Studies of Crystal Perfection. Louis Gold. *U. S. Atomic Energy Commission*, AECD-2643 & 2645, July 20, 1949 and July 21, 1949, 32 pages and 18 pages.

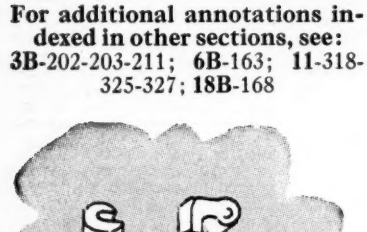
Part I describes method and difficulties. Part II describes Rocking curve measurements, Laue patterns, and fractographic examination of the resulting crystals. 41 ref.

4D-61. Untersuchungen zum Keimproblem in Leichtmetallschmelzen. (Research on the Nuclei Problem in Light-Metal Melts.) E. Onitsch. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 295-298.

Melts rich in nuclei will result in fine-granular structures under any

cooling conditions, while melts with few nuclei will have a fine-granular structure only when cooled at a rapid rate. 14 ref.

For additional annotations indexed in other sections, see:
3B-202-203-211; **6B**-163; **11**-318-325-327; **18B**-168



5A—General

5A-51. Investigation of Bonding Between Metals and Ceramics. I. Nickel, Cobalt, Iron, or Chromium With Boron Carbide. H. J. Hamjian and W. G. Lidman. *National Advisory Committee for Aeronautics*, Technical Note 1948, Sept. 1949, 23 pages.

Investigated after exposure at temperatures above the melting temperature of the metal constituent. Simple bonding experiments were made to indicate the compatibility of various metals and a ceramic to form a ceramal. Temperature, time at temperature, and atmosphere suitable for sintering the ceramal are indicated by results of preliminary experiments. 10 ref.

5A-52. Penetration of Sintered Metals by Solutions of Surface-Active Agents. A. J. Finks and N. J. Petito. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1101-1102.

Method which indicates the comparative wetting and penetrating qualities of surface-active agents. Application to stainless steel filter elements of varying porosities. Suggests application to other metals, glass fabrics, and for research on metal cleaning or lubrication.

5A-53. Structural Parts From Metal Powders. H. R. Clauser. *Materials & Methods*, v. 30, Sept. 1949, p. 85-92.

The various metal powders used for structural parts; selection considerations and design principles.

5A-54. Powder Metallurgy. J. P. Saville. *Discovery*, v. 10, Sept. 1949, p. 294-298.

Applications and limitations of the process; powder metal magnets.

5A-55. Keramische Stoffe im Austausch für Metalle. (Ceramics as Substitutes for Metals.) F. Reinhart. *Zeitschrift des vereines Deutscher Ingenieure*, v. 91, July 15, 1949, p. 341-343.

Practicability of using ceramics (with and without metallic admixtures) for movable and immovable machine parts, and complete machines and implements. Methods of working ceramic materials.

5A-56. Design in Powder Metallurgy. H. W. Greenwood. *Metallurgia*, v. 40, Sept. 1949, p. 255-256.

Importance of proper design.

5A-57. On the Initiation of Reactions Between Solid Phases. A. Smekal. *Powder Metallurgy Bulletin*, v. 4, Sept. 1949, p. 120-126.

The first mechanical contact between two particles takes place over areas which, from molecular dimensions up to diameters of the order of 1 micron, permit utilization of the full strength of the chemical bonding forces. When critical resistivity values are reached, the structural elements become highly reactive. This stage leads locally — depending on chemical nature and homogeneous or heterogeneous character of the components—to chemical reactions, alloy formation or bonding by fusion. To initiate such processes, the small loads involved in the packing or mixing of loose powders are shown to be fully sufficient. 14 ref.

5A-58. Determination of Green Strength by the Transverse Rupture Test. J. P. Scanlan and R. P. Seelig. *Powder Metallurgy Bulletin*, v. 4, Sept. 1949, p. 128-132.

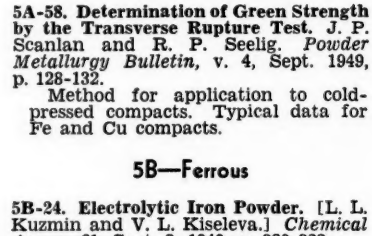
Method for application to cold-pressed compacts. Typical data for Fe and Cu compacts.

5B—Ferrous

5B-24. Electrolytic Iron Powder. [L. L. Kuzmin and V. L. Kiseleva.] *Chemical Age*, v. 61, Sept. 3, 1949, p. 320-322.

Previously abstracted from *Zhurnal Prikladnoĭ Khimii* (Journal of Applied Chemistry). See item 5B-17, 1949.

For additional annotations indexed in other sections, see:
23A-31



6A—General

6A-113. Hydrofluoric Acid Versus Construction Materials. *Chemical Engineering*, v. 56, Sept. 1949, p. 229-230.

Part I of a symposium in which a representative group of construction materials are evaluated for services involving HF. Consists of the following: "Stainless Steel", W. G. Renshaw; "Hastelloy Alloys", C. G. Chisholm; and "Iron and Steel", A. W. Spitz.

6A-114. Protective Coatings for Fatty Acids. Fred L. Sharpe, Jr., and Kenneth Tator. *Chemical Engineering*, v. 56, Sept. 1949, p. 230, 232.

Use of phenolformaldehyde resins and various other resinous coatings to prevent corrosion of metals by fatty acids.

6A-115. Corrosion Testing Facilities at Kure Beach, North Carolina. Ivy M. Parker. *Corrosion*, v. 5, Sept. 1949, p. 303-307.

Extensive illustrated description.

6A-116. Lubricating Oil Additives. Part IV. Oxidation Inhibitors and Detergents. V. A. Kalichevsky. *Petroleum Refiner*, v. 28, Sept. 1949, p. 85-93.

Extensive tabular lists of patented oxidation and corrosion inhibitors and metal derivatives of the detergent type, indicating both trade and chemical names. Name of compound or group of compounds is accompanied by patent numbers, date, and inventors' names.

6A-117. Corrosion at Elevated Temperatures and Pressures. M. G. Fontana. *Alloy Casting Bulletin*, no. 13, Aug. 1949, p. 5-6.

Research program includes a variety of metals, alloys, and corrosion media. Work to date covers corrosion of CF-8 and CF-8M type alloys, particularly by nitric acid. Data for Ti and CF-8 in two conditions. (CF-8 contains 19.28% Cr, 9.65% Ni, 0.068% C, 1.52% Si, and 0.67% Mn.)

6A-118. The Cost of Corrosion to the U. S. Herbert H. Uhlig. *Chemical and Engineering News*, v. 27, Sept. 26, 1949, p. 2764-2767.

Quantitative estimates based on a survey. 16 ref.

6A-119. Notes on Galvanic Corrosion. F. L. Laque and W. D. Mogerman. *World Oil*, v. 129, Oct. 1949, p. 153-154, 158.

The theory of bimetallic corrosion, and the relative intensity of corrosion of metals placed in conditions of electrolytic action. Recommendations as to choice of metals with emphasis on one-metal construction wherever possible.

6A-120. Investigation of Cavitation Corrosion. G. Petracchi. *Engineers' Digest*, v. 10, Sept. 1949, p. 314-316.

Previously abstracted from *La Metallurgia Italiana*. See item 6A-52, 1949.

6A-121. A Comparison of Some Metals for Use in Acid Pickling Baskets. E. E. Halls. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2127-2130, 2136.

Experimental results for a series of common metals and alloys in several types of pickling solutions.

6A-122. Neue Versuche über die Lokalelementtätigkeit von Oxydbedeckungen auf Metalloberflächen. (Recent Experiments on the Local Galvanic Action of Oxide Coatings on Metal Surfaces.) F. Tödt. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 273-278.

Studied by amplifying the rate of solution of "aerated" iron and by directly measuring the generated current of "aerated" metal surfaces (Fe, Cu, Pt) against a less noble and practically unpolarizable electrode. The two methods afford an insight into the local galvanic action between metal and oxide skin. Rates of oxidation and thickness of oxide skins. 19 ref.

6B—Ferrous

6B-147. An X-Ray Study of the Scale Formed on Iron Between 400 and 700° C. O. A. Tesche. *American Society for Metals*, Preprint No. 12, 1949, 9 pages.

Scales formed on oxidation for 15 min. over the above temperature range were studied. Fe_3O_4 is the only oxide formed up to 625° C. At 650-700° C. a double-layered scale was found, FeO lying next to the metal with an overlay of Fe_3O_4. 20 ref.

6B-148. Stress-Corrosion in a Stainless Steel Compressor. Frank W. Davis. *American Society for Metals*, Preprint No. 27, 1949, 19 pages.

Describes the above illustrated by stress corrosion of two rotors. The unit was used to compress steam. Chlorides were contained in both the raw-water supply and leachings from parts of the failed unit but the condensate produced contained less than 0.5 ppm. solids. Excessive dynamic stresses were imposed by mechanical removal of unequal lengths from all vane tips. Changes in design and operation have been made. Several of the new units have been in service for over a year without trouble.

6B-149. Sodium Nitrite as an Inhibitor Against the Attack of Sea Water on Steel. Part II. The Addition of Other Inhibitors to Nitrite. D. Wyllie and G.

C. N. Cheesman. *Journal of the Society of Chemical Industry*, v. 68, July 1949, p. 209-212.

Efficiency and probable mode of action of phosphates, carbonates, sulfates, and Zn salts. 10 ref.

6B-150. Corrosion of Turbine Journals. S. E. Bowrey. *Journal of the American Society of Naval Engineers*, v. 61, Aug. 1949, p. 664-682. Reprinted from *Institute of Marine Engineers, Transactions*, v. 61, 1949.

Several wartime cases of corrosion in marine turbines. Possible causes and preventive measures. Laboratory work and practical trials showed value of sodium nitrite as a corrosion inhibitor. Recommended concentrations and methods of use.

6B-151. Annual Rust and Corrosion Loss. Rogers Clark. *Sheet Metal Worker*, v. 40, Sept. 1949, p. 40-41, 43.

Development of fish oil as a primer coat to prevent corrosion.

6B-152. Engineering Aspects of Cathodic Protection as Applied to Pipe Lines. E. P. Doremus, G. L. Doremus, and M. E. Parker. *Corrosion*, v. 5, Sept. 1949, p. 273-281.

Designing for complete protection.

6B-153. The Cathodic Protection of Steel Piling in Sea Water. H. A. Humble. *Corrosion*, v. 5, Sept. 1949, p. 292-300; discussion, p. 300-302.

Applications where varying conditions of exposure and nonuniform corrosion attack are encountered.

6B-154. A Method for Activating Stainless Steel Specimens Prior to Corrosion Tests. R. O. Bayer and E. A. Kachik. *Corrosion*, v. 5, Sept. 1949, p. 308-310.

In corrosion testing the austenitic stainless steels, it often happens that some of a group of apparently identical specimens, under the same conditions, will corrode while others will not. This behavior is termed borderline passivity. Procedure for ensuring that all specimens are initially active involves pickling just prior to introduction into the corrosive medium.

6B-155. Erkenntnisse über das Rosten und den Rostschutz von Eisen und Stahl (1946 und 1947). (Information on Rusting and Rust Protection of Iron and Steel, 1946 and 1947.) Heinrich Steinrath. *Stahl und Eisen*, v. 69, July 21, 1949, p. 528-531.

First part of a review of the literature. 52 ref. (To be continued.)

6B-156. Electrochemical Behavior of Zinc and Steel in Aqueous Media. R. B. Hoxeng and C. F. Prutton. *Corrosion*, v. 5, Oct. 1949, p. 330-338; discussion, p. 338.

Progress report of an investigation, resulting from the failure of galvanized pipe, to determine the effect of electrolyte composition and temperature on the electrochemical relationship between zinc and steel in natural and industrial waters. Results show that electrolyte composition is of even more importance than temperature. 14 ref.

6B-157. Deterioration of Steel Sheet Pile Groins at Palm Beach, Florida. Culbertson W. Ross. *Corrosion*, v. 5, Oct. 1949, p. 339-342.

Groins are used to prevent the motion of sand along the beach. Tests showed that deterioration was caused by the abrasive action of sand carried by waves.

6B-158. A Note on the Effect of Variations of Exposed Area on the Solution Potential and Corrosion Rate of Low Carbon Steel. J. M. Bialosky. *Corrosion*, v. 5, Oct. 1949, p. 346-349; discussion, p. 349.

Solution potential and weight losses were measured. Tests were conducted in a circular path apparatus with aerated 3.5% salt solution as the corroding medium. The concentration of the corroding solution, temperature, aeration, solution volume, and velocity were controlled.

6B-159. High Speed Stress and Corrosion Tester Developed for Oil Well Drill Pipe. *Corrosion*, v. 5, Oct. 1949, p. 354.

Full-sized specimens are tested from brines in a machine developed by U. S. Steel Corp., National Tube Co.

6B-160. Field and Laboratory Tests of Sodium Chromates and Alkalies for Controlling Corrosion in Gas Condensate Wells. Part 4. Tests of Mixtures of Sodium Chromate and Sodium Hydroxide. C. K. Eilerts, R. V. Smith, F. G. Archer, L. M. Burman, Faye Greene, and H. C. Hamontre. *World Oil*, v. 129, Oct. 1949, p. 174, 176, 178, 180.

6B-161. Mitigation of Corrosion of Bare Pipe Lines by Application of Magnesium Anodes. Robert L. Bullock. *Oil and Gas Journal*, v. 48, Oct. 6, 1949, p. 267-268, 271-272.

New method of cathodic protection of old, bare pipelines.

6B-162. The Effect of Oxygen on Inhibition of Corrosion by Nitrite. Morris Cohen, Rowena Pyke, and Paul Marier. *Journal of the Electrochemical Society*, v. 96, Oct. 1949, p. 254-261.

Effects of concentration of dissolved oxygen and temperature on rate of breakdown of sodium nitrite in the presence of steel, and on rate of corrosion of the steel. At any given temperature, increase in concentration of oxygen decreased the amount of nitrite required for inhibition.

6B-163. Metallurgical Aspects of Heat Checking in Brass Die Casting Dies. Part I. A. E. Nehrenberg. *Die Castings*, v. 7, Oct. 1949, p. 30-34, 36, 75-77.

Heat treatment, properties and structure of steel dies were investigated in relation to heat checking resulting from pressure brass die casting. (To be continued.)

6C—Nonferrous

6C-68. The High Temperature Oxidation of Manganese. Raymond S. Gurnick and William M. Baldwin, Jr. *American Society for Metals*, Preprint No. 9, 1949, 12 pages.

Samples of easily maintained and accurately measured surface area were obtained by electroplating the metal on a tough backing. It was found that manganese obeys the Pilling and Bedworth parabolic law ($w^2 = Kt$, where w is weight increase due to fixation of oxygen, t is time, and K is a constant) when scaled in air from 400 to 1100° C. The scaling constant, K, was found to adhere to a single Arrhenius-type curve over the entire temperature range. The scale virtually consisted of Mn_3O_4 only up to 900° C. From this temperature on, MnO appeared in increasing proportion. Possible effect of MnO on scaling constant at higher temperatures. 13 ref.

6C-69. The Use of Selenium Rectifiers as One-Way Valves in Electrolysis Drainage Wires. W. D. Connon. *Corrosion*, v. 5, Oct. 1949, p. 315-318.

Anodic corrosion due to reversal of potential in trolley systems. Prevention methods.

6C-70. Corrosion Resistance of Commercially Pure Titanium. G. E. Hutchinson and P. H. Permar. *Corrosion*, v. 5, Oct. 1949, p. 319-324; discussion, p. 324-325.

Resistance to sea water, atmospheric corrosion, and selected chemical reagents was investigated. Good resistance to corrosion, coupled with excellent strength-weight properties, indicates promising applications. 12 ref.

6C-71. High Temperature Scaling of Cobalt. Charley R. Johns and William Marsh Baldwin, Jr. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 720-721.

Reviews previous work and reports results of an investigation on the discrepancies observed. 11 ref.

6C-72. Corrosion and Growth of Lead-Calcium Alloy Storage Battery Grids as a Function of Calcium Content. U. B. Thomas, F. T. Forster, and H. E. Haring. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 313-325; discussion, p. 325.

Previously abstracted from Preprint 92-12. See item 6-281, 1947.

6D—Light Metals

6D-27. Über den Einfluss der natürlichen Witterung auf die Spannungskorrosion von Aluminiumlegierungen. (The Effect of Natural Weathering on the Stress-Corrosion of Aluminum Alloys.) Gerhard Schikorr and Günter Wassermann. *Zeitschrift für Metallkunde*, v. 40, June 1949, p. 201-205.

Experiments on Al alloys in industrial, city, maritime, and rural atmospheres. Results are compared with those obtained on immersion in a 3% common salt solution.

6D-28. The Dissolution of Aluminum in Sodium Hydroxide Solutions. II. Michael A. Streicher. *Journal of the Electrochemical Society*, v. 96, Sept. 1949, p. 170-194.

Effect of impurities, of NaOH concentration, of temperature and agitation on alloy, and of external current. Electrode potential measurements. 31 ref.

6D-29. Aluminium and the Transport of Refuse and Sewage. *Light Metals*, v. 12, Sept. 1949, p. 470-474.

An investigation of corrosion problems in the use of certain light alloys in the construction of special vehicles.

For additional annotations indexed in other sections, see:
3B-200-206; **7A**-148; **7B**-218; **21B**-59; **23D**-112

7A—General

7A-148. Corrosion Resistance of Sprayed Metal Coating. Walter B. Meyer. *Corrosion*, v. 5, Sept. 1949, p. 282-287.

Fundamental structural features of coatings which affect mechanical properties and corrosion resistance. Metals used, applications, and advantages and disadvantages for specific uses.

7A-149. Low Pressure Spraying. Marcel L. Pouilly. *Better Enameling*, v. 20, Sept. 1949, p. 22-23, 31.

Recommendations applicable to porcelain enameling.

7A-150. Simplified Methods of Cleaning

Metals for Plating. Jerome L. Bleiweis. *Materials & Methods*, v. 30, Sept. 1949, p. 74-77.

Recommendations for methods and compounds

7A-151. Flame-Sprayed Polythene Coatings Provide Exceptional Corrosion Resistance. *Materials & Methods*, v. 30, Sept. 1949, p. 81.

Exposure tests of one year's duration have shown no deterioration by HCl, HF, H_2SO_4, and HCOOH. Polythene films, modified with graphite, were found to be free of porosity by spark tests in the neighborhood of 30,000 volts, and various other short-time exposures to a variety of chemicals have been successfully withstood

7A-152. Chemical Polishing Puts Ax to Finishing Costs. *Modern Industry*, v. 18, Sept. 15, 1949, p. 95.

Patented method developed at Battelle Memorial Institute which requires no electrical current, and promises to eliminate the need for labor-consuming buffing operations. It may be applied to many odd-shaped parts difficult to buff. Originally developed for brass, the process is readily applied to copper and nickel-silver. Minor modifications of the bath make it suitable for monel and nickel. It may be possible to develop a bath suitable for stainless steel and perhaps even for such metals as titanium

7A-153. Lacquers for Metals; Development of Protective Organic Films. E. S. Tonks. *Metal Industry*, v. 75, Sept. 9, 1949, p. 207-208

7A-154. Die praktische Nutzanwendung des Metallspritzverfahrens. (Practical Applications of the Metal-Spraying Process.) H. Reininger. *Metalloberfläche* v. 3, sec. A, Aug. 1949, p. A149-A155.

Fourth of a series. Metallizing of metal parts as protection against corrosion and scaling or for repairs. Literature data on properties and limitations of different sprayed metals on various metallic and non-metallic objects. 85 ref. (To be continued.)

7A-155. Cleaning Forgings. L. J. Wieschhaus. *Metal Progress*, v. 56, Oct. 1949, p. 496-497.

New method which is cheaper than pickling, tumbling, and sandblasting.

7A-156. Setting Up Polishing Wheels. *Plating*, v. 36, Oct. 1949, p. 1020-1027.

Picture story based on set-up instructions for polishing and buffing wheels by General Motors Overseas Operations.

7A-157. Latest Developments in Phosphate Coating Methods and Technique. H. A. Holden. *Journal of the Electrodepositors' Technical Society*, v. 24, 1949, p. 111-121; discussion p. 122-128. (Preprint.)

Survey for the past five years. 20 ref.

7A-158. Turkish Bath for Metals. *DuPont Magazine*, v. 43, Oct.-Nov. 1949, p. 21-22.

Vapor degreasing with modern chlorinated solvents which increases the life expectancy of metal finishes.

7A-159. Metal Spray Repairs Hydraulic Turbine. *Power*, v. 93, Oct. 1949, p. 92-93

Method to repair cavitation damage, which keeps sprayed metal in place.

7A-160. Selecting Economical Inorganic Finishes. Jerome L. Bleiweis. *Product Engineering*, v. 20, Oct. 1949, p. 146-150

Economy versus utility of inorganic coatings on ferrous metals and Zn alloy die castings.

7A-161. Bright Finish for Metals. *Science News Letter* v. 56, Oct. 8, 1949, p. 227

New chemical polishing process developed by Battelle Memorial Institute, which is applicable to many metal products.

7A-162. Soap in Metal Treatments. Georgia Leffingwell. *Products Finishing*, v. 14, Oct. 1949, p. 24, 26, 28, 30.

Use in cleaning metal surfaces before finishing. 16 ref.

7A-163. New Method of Applying Wrinkle Paint to Castings. *Die Castings*, v. 7, Oct. 1949, p. 53-54.

The "Dipspray" process for finishing smooth surfaced castings which may be subject to porosity.

7A-164. Metallising in Relation to Foundry Practice. J. Barrington Stiles. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A202-A208; discussion, p. A209-A210.

Previously abstracted from *Foundry Trade Journal*. See item 7A-12, 1949.

7A-165. Continental Trends in Metal Finishing. W. F. Coxon. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 91-93; discussion, p. 103-108.

Personal impressions as a result of investigation tours. Anodizing and electropolishing of aluminum, phosphating, and electroplating.

7A-166. Tarnishing and Related Phenomena. U. R. Evans. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 179-184; discussion, p. 209-213.

Previously abstracted from *Sheet Metal Industries*. See item 7-464, 1947.

7A-167. Chemical Cleaning of Heat-Exchange Equipment. C. M. Loucks and C. H. Groom. *Transactions of the American Society of Mechanical Engineers*, v. 71, Oct. 1949, p. 831-836.

Use of chemical solvents—types of deposits, solvents available, and metals encountered. A number of case

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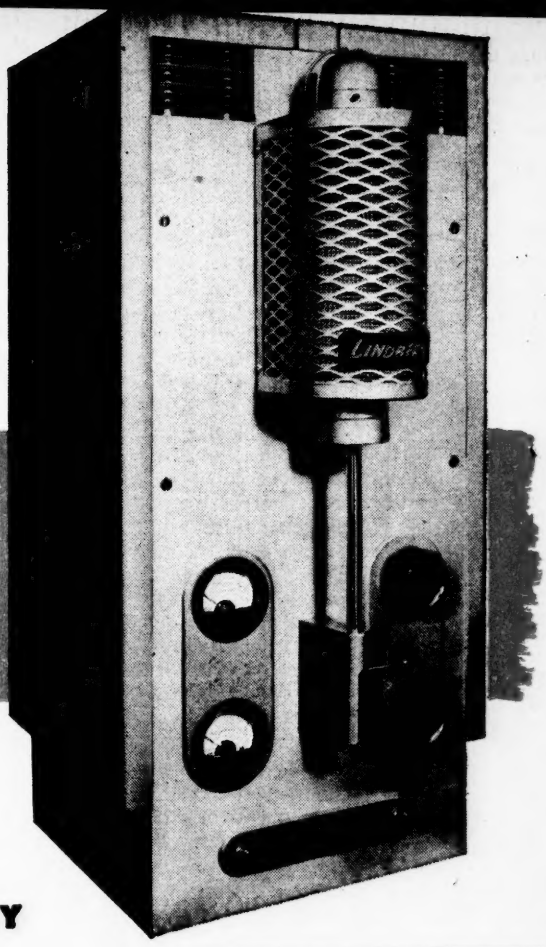

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histories illustrating chemical cleaning in various industries. 16 ref.

7A-168. Stop Corrosion With Sprayed-On Zinc. John E. Wakefield. *Refrigerating Engineering*, v. 57, Oct. 1949, p. 982-985.

Use in factory and field for protecting refrigeration equipment.

7B—Ferrous

7B-197. Production Painting of Metal for Power Shovel Cabs. Walter Rudolph. *Industrial Finishing*, v. 25, Sept. 1949, p. 37-38, 40, 42.

Methods and equipment used in a comparatively small paint shop by which all sheet-metal panels and various other parts are cleaned by hand, spray painted, and then moved through an infrared baking oven.

7B-198. Phosphate Processes for Iron and Steel With Special Reference to Rust-Proofing. E. E. Halls. *Metallurgia*, v. 40, July 1949, p. 159-163; Aug. 1949, p. 193-199.

Phosphate treatments developed for wear resistance where metal-to-metal contact is involved in the functioning of a mechanism. In some instances sheet or strip is phosphated to assist drawing operations in pressing and to reduce wear on tools. Phosphated sheet as a substitute for tin plate. Test results.

7B-199. Trouble Shootin'. John L. McLaughlin. *Better Enameling*, v. 20, Sept. 1949, p. 17-19.

Photomicrographic cross sections of enameling defect known as blistering. Causes and remedies.

7B-200. 3 Generations of Quality Products. That's the Story of Crown Stove Works. *Better Enameling*, v. 20, Sept. 1949, p. 8-15.

Miscellaneous procedures and equipment, with emphasis on enameling and forming.

7B-201. An Investigation of Structural Steel Shop Coat Priming Paint. S. C. Frye. *Corrosion*, v. 5, Sept. 1949, p. 288-291.

Test results for 17 paints using three types of pigmentation on structural steel in different conditions: as received from the mill, pickled in inhibited acid, and after different degrees of rusting followed by scale removal.

7B-202. The Practical Problems of Corrosion. Part XIII. The Painting of Wet Steel Surfaces. J. E. O. Mayne and U. R. Evans. *Journal of the Society of Chemical Industry*, v. 68, July 1949, p. 212-215.

Several types of paints were applied to wet hot rolled mild steel in various conditions. No difference between these specimens and those painted while dry could be detected after 8 years outdoor exposure. The evidence is not believed sufficient to justify disregarding the usual recommendations against painting wet surfaces.

7B-203. Lowering Costs by Prefinishing Bumper Bars. *Automotive Industries*, v. 101, Sept. 15, 1949, p. 35.

New method of polishing the steel in the flat with abrasive belts. Limited to the cold formed type of bumper bar.

7B-204. Rotodip and Rotospray at Morris Cowley. *Electroplating and Metal Finishing*, v. 2, Aug. 1949, p. 533-539.

British plant for mechanized cleaning, phosphating, and primer painting motor-car bodies including associated sheet metal components. (To be continued.)

7B-205. Automatic Spray Finishing Saves Manpower and Materials. *Steel*, v. 125, Sept. 26, 1949, p. 98, 100.

A completely conveyerized operation in which both flanged and pie-shaped bolted tank plates for fuel-oil storage tanks are washed, painted, and baked at high speed. Electrostatic paint spraying is used for both primer and finished coats.

7B-206. Prefinishing of Steel for Plating or Enamelling Cuts Production Costs. Kenneth Rose. *Materials & Methods*, v. 30, Oct. 1949, p. 67-69.

Shows that buffing and polishing steel in the flat and protecting the surface during forming with a special coating saves money in preparing irregular shapes for final finishing.

7B-207. A Modern Finishing Plant for Electric Ranges. E. F. Shart and D. M. Root. *Finish*, v. 6, Oct. 1949, p. H39-H43, H54.

Completely conveyerized department for cleaning and finishing Hotpoint range parts.

7B-208. Practical Applications of Modern Products. *Products Finishing*, v. 14, Oct. 1949, p. 78-80, 82, 84.

Flexible automatic polishing and buffing machines which speed automotive trim finishing; electric hoist equipment which speeds finishing of air brake hose clamps; and phosphatizing treatment for transformer radiators.

7B-209. A Study of Shop Coat Structural Steel Paint Primer. S. C. Frye and G. Diehlman. *American Railway Engineering Association, Bulletin*, v. 51, Sept.-Oct. 1949, p. 87-103.

See abstract from *Corrosion*, item 7B-201, 1949.

7B-210. Salt-Bath Chromizing. I. E. Campbell, V. D. Barth, R. F. Hoeckelman, and B. W. Gonser. *Journal of the Electrochemical Society*, v. 96, Oct. 1949, p. 262-273.

See abstract of condensed version from *Iron Age*, item 18B-95, 1949.

7B-211. Application and Firing of Low Temperature Enamels. P. M. Wheeler and O. R. Novy. *Better Enameling*, v. 20, Oct. 1949, p. 6-8, 22-23.

Low-temperature enamels are defined as those which mature at 1250-1350° F. Advantages of these enamels and changes in techniques required.

7B-212. Grit Blasting Sheet Steel Parts for Porcelain Enameling. A. E. Raeuber and E. C. Ploetz. *Better Enameling*, v. 20, Oct. 1949, p. 14-15, 27.

Advantages, as compared with sand blasting. Experimental results obtained with low-carbon steel grit.

7B-213. The Operation and Maintenance of Spray Pickling Equipment. H. C. Ellinger. *Better Enameling*, v. 20, Oct. 1949, p. 17-18, 27.

Various solutions involved, as well as the equipment used.

7B-214. Emulsion and Alkaline Cleaning. A. J. Holloway. *Better Enameling*, v. 20, Oct. 1949, p. 19, 30.

Experimental work as applied to steel preparatory to porcelain enameling.

7B-215. Trouble Shootin'. John L. McLaughlin. *Better Enameling*, v. 20, Oct. 1949, p. 36-37.

Causes and remedies for the following porcelain enamel defects: black specks, greasy appearance, shorelines, and black hairlines.

7B-216. Continuous Galvanizing—A Development Program. A. H. Ward. *Iron Age*, v. 164, Oct. 13, 1949, p. 74-79, 154.

Production-line galvanizing of heavy-gage sheets in coils weighing up to 50,000 lb. was made possible only after extensive research. Results obtained in the preliminary investigation and various fundamental factors, including coating adherences and base-metal properties, as related to conventional and continuous galvanizing.

7B-217. Satin Finishing Stainless Products. Fred Littlejohn. *Steel*, v. 125, Oct. 17, 1949, p. 81-82.

Use of coated abrasive-belt polishing machines or special brush-backed finishing tools to achieve various architectural and decorative effects.

7B-218. Über den Einfluss saurer und neutraler Phosphatlosungen auf Flussstahl. (The Effect of Acid and Neutral Phosphate Solutions on Ingot Steel.) G. Seelmeyer. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 289-294.

The corrosive effects of phosphates added to the water in hot water heating plants was investigated to determine whether the phosphate ion alone or only in conjunction with other ions has a passivating effect. Potentials, measured and correlated with phosphate concentration and time, indicate that neither phosphate ions alone nor $FePO_4$ films at pH values of 8.8 have a sufficient passivating effect to account for the corrosion-inhibitive effect. 11 ref.

7C—Nonferrous

7C-39. Chemical Treatments for Zinc Surfaces—A Review. H. A. Holden. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 57-65; discussion, p. 67-70.

Previously abstracted from *Sheet Metal Industries*. See item 7-409, 1947.

7D—Light Metals

7D-47. Ursache und Verlauf der spontanen Zersetzung von Trichloräthylen durch Aluminium. (Cause and Course of the Spontaneous Decomposition of Trichloroethylene by Aluminum.) Ludwig Metz and Alfred Roedig. *Chemie-Ingenieur-Technik*, v. 21, May 1949, p. 191-193.

Experiments were made to explain fires and explosions that occurred when Al alloys were degreased with C_2HCl_3. $AlCl_3$ catalyzes the condensation of C_2HCl_3 and the heat of the reaction dechlorinates the condensation products and completely oxidizes the Al chips. Proposes the use of tetrachloroethylene instead. 14 ref.

7D-48. Finishing Aluminum Tubs With a Durable White. P. C. Bardin. *Industrial Finishing*, v. 25, Sept. 1949, p. 18-20, 22, 24.

Modern production setup for cleaning, treating, and white enameling aluminum tubs and stands for washing machines.

7D-49. Polishing Aluminum With Abrasive Belts. *Reynolds Metals Technical Advisor*, no. 11, 1949, p. 1-2.

Different setups and polishing wheels. Belt recommendations and operating practice.

7D-50. How To Protect Aluminum Windows From Plaster and Mortar. *Modern Metals*, v. 5, Sept. 1949, p. 24-25.

Cleaning and conditioning with "Duridine" and coating with clear lacquer.

7D-51. Preparation of Aluminum Sheet Surfaces for Painting. Robert I. Wray. *American Paint Journal*, v. 33, Sept. 19, 1949, p. 28-29, 32, 34, 36, 38.

Recommended procedures for interior and exterior residential and industrial surfaces.

7D-52. Surface Treatment and Finishing of Light Metals: Part 4. Chemical Cleaning and Pretreatment Processes. S. Wernick and R. Pinner. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1953-1959.

A review. 128 ref.

7D-53. Metallizing Paper for Capacitors. H. G. Wehe. *Bell Laboratories Record*, v. 27, Sept. 1949, p. 317-321.

Two strips of Al are separated by two sheets of chemically pure Kraft paper.

7D-54. Protective Treatments for Aluminum. Jerome L. Bleiweis. *American Machinist*, v. 93, Oct. 6, 1949, p. 149, 151.

The Alrok process, the Alumilite process, and anodizing.

7D-55. Metal Finishing Process Information Sheets. V. George Black. *Product Engineering*, v. 20, Oct. 1949, p. 161.

Compilation of four different processes used in preparing and finishing magnesium.

7D-56. Finishing Operations in a "King-Size" Job Shop. Ezra A. Blount. *Products Finishing*, v. 14, Oct. 1949, p. 10-18, 20.

Aluminum parts are fabricated and finished by anodizing, phosphatizing, and spray painting.

7D-57. Plating Aluminium. S. Heiman. *Metal Industry*, v. 75, Sept. 23, 1949, p. 246-249.

Previously abstracted from *Journal of the Electrochemical Society*. See item 7D-26, 1949.

7D-58. Hoover Cleaners Finished in Wrinkle. *Organic Finishing*, v. 10, Sept. 1949, p. 17-19.

Procedures for finishing die-cast Al housings.

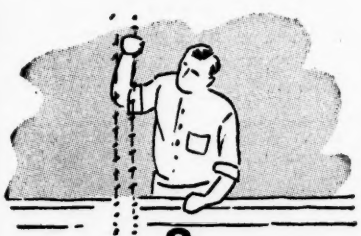
7D-59. The Surface Finishing of Aluminium. James F. Driver. *Machinery Lloyd* (Overseas Edition), v. 21, Sept. 24, 1949, p. 111-113.

Four British patented processes.

7D-60. (Book) Finishes for Aluminum. 124 pages. 1949. Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky. Free.

Basic information on various processes for applying surface finishes to aluminum as well as characteristics of these finishes.

For additional annotations indexed in other sections, see: 10C-150; 14B-117; 19A-237; 19B-196-201; 19D-60



8 ELECTRODEPOSITION and ELECTROFINISHING

8-244. Electrolytic Tinplate — Its Production and Benefits. Samuel S. Johnston. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1962-1964. A condensation.

U. S. procedures. Two distinct systems (acid and alkaline) are distinguished. 10 ref.

8-245. Ediphone Standardized Plating Racks. P. B. Kasakove. *Iron Age*, v. 164, Sept. 22, 1949, p. 82-83.

Four standardized racks used in plating over 500 different parts made of copper, brass, steel, zinc, and aluminum.

8-246. Anodising of Aluminum Wire and Strip. N. D. Pullen. *Electroplating and Metal Finishing*, v. 3, Sept. 1949, p. 3-8.

Problems involved in the treatment of continuous lengths and principles underlying the design of commercial plant, with particular reference to domestic as well as electrical applications.

8-247. Addition Agents for Zinc Plating Solutions. *Electroplating and Metal Finishing*, v. 3, Sept. 1949, p. 9-13.

A tabular list of substances commonly added to basic Zn plating solutions to assist in production of bright deposits, to extend the bright current density range or to improve covering power at low current densities; also the more important patent claims in this field.

8-248. Efco-Udylite Bright Nickel High Chloride Solution for Zinc Base Articles. *Electroplating and Metal Finishing*, v. 3, Sept. 1949, p. 21.

Properties and composition of British patented solution.

8-249. Nouvelle détermination en absence d'oxygène du potentiel de dissolution de l'aluminium poli électrolytiquement. (A New Determination of Solution of Potential of Electropolished Aluminum in Absence of Oxygen.) Georges Chaudron, Paul Lacombe and Georges Youssov. *Comptes Rendus* (France), v. 229, July 18, 1949, p. 201-203.

Electrolytic solution potential was determined in 3% NaCl solution in the absence of oxygen (N_2 atmosphere). Apparatus, procedure and results. Effects of addition of 0.2% $HgCl_2$ to the solution.

8-250. L'oxydation anodique du ferrochrome dans une solution de soude. (Anodic Oxidation of Ferrochromium in a Solution of Sodium Carbonate.) Jean Besson and Chu Yung-Choo. *Comptes Rendus* (France), v. 229, July 18, 1949, p. 207-209.

Two specimens (29.2 and 32.4% Fe, and 60.0 and 63.9% Cr) were used. Anodic oxidation resulted in formation of chromate under the conditions of experiment, followed by formation of a more or less adherent film of iron oxide on the anode.

8-251. Electrode Potentials of Mechanically Treated Metal During Anodic Dissolution. (In Russian.) G. S. Vozdvizhenskii and V. A. Dmitriev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 11, 1949, p. 227-229.

The problem was investigated for copper. Results clearly show the influence of structural changes of the metal surface during working on the electrode potentials of such surfaces.

8-252. Drop Forge Dies. S. L. Scheier and R. E. Christin. *Metal Progress*, v. 56, Oct. 1949, p. 492-494.

Advantages of hard chromium plating drop hammer forging dies. Types that can be plated at a savings.

8-253. Electroplating With Solder. L. H. Seabright. *Metal Progress*, v. 56, Oct. 1949, p. 509-510.

Electroplating Pb-Sn alloy on small parts facilitates subsequent soldering.

8-254. Anodic Oxide Coating Formation on Aluminium Alloys. W. N. Bradshaw and S. G. Clarke. *Journal of the Electrodepositors' Technical Society*, v. 24, 1949, p. 147-166; discussion, p. 167-170.

Results on anodizing a range of alloys under conditions of the D.T.D. Specification 910, with special reference to weight of coating, attack on the metal, density, and microporosity of the coating and stress in its formation. Some results of the chemical M. B. V. process are given. 10 ref.

8-255. Baths for Copper Plating. M. J. Salauzie. *Engineers' Digest*, v. 10, Sept. 1949, p. 311-313. Translated and condensed from *Bulletin de la Société Francaise des Electriciens*, ser. 6, v. 9, Jan. 1949, p. 23-30.

Advantages and disadvantages of commonly used baths. Modernization of the cyanide bath, bath designed to replace the cyanide baths, and baths to replace $CuSO_4$.

8-256. Electrochemical Cleaning of a Large Steel Casting—An Experiment. John A. Wettergreen. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 486-490; discussion, p. 490-491.

Previously abstracted from *American Foundryman*. See item 7b-81, 1948.

8-257. Coordination Compounds in the Electrodeposition of Chromium. R. W. Parry, Sherlock Swann, Jr., and John C. Ballar, Jr. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 507-518; discussion, p. 518.

Previously abstracted from Preprint 92-27. See item 8-165, 1947.

8-258. A Semi-Quantitative Method for Measuring the Ductility of Chromium Electrodeposits. M. R. J. Wyllie. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 519-536.

Previously abstracted from Preprint 92-5, 1947. See item 8-158, 1947.

8-259. A Theory for the Mechanism of Chromium Plating; A Theory for the Physical Characteristics of Chromium Plate. Cloyd A. Snavely. *Transactions of the Electrochemical Society*, v. 92, p. 537-576; discussion, p. 576-577.

Previously abstracted from Preprint 92-35. See item 8-61, 1948.

8-260. The Principles and Scientific Applications of the Electrolytic Polishing of Metals. P. A. Jacquet. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 3-14; discussion, p. 43-55.

Previously abstracted from *Sheet Metal Industries*. See item 7-410, 1947.

8-261. Technical Applications of Electrolytic Polishing. R. E. Halut. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 15-24; discussion, p. 43-55.

See previous abstract from *Sheet Metal Industries*, item 8-13, 1948.

8-262. Some Special Applications of Electrolytic Polishing. H. C. J. de Decker, A. P. Krijff, and J. M. Pluut. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 25-32; discussion, p. 43-55.

Previously abstracted from *Sheet Metal Industries*. See item 7-466, 1947.

8-263. Electrolytic Polishing of Brass Pressings. P. Berger. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 33-40; discussion, p. 43-55.

Previously abstracted from *Sheet Metal Industries*. See item 7-505, 1947.

8-264. Silverplating in Australia. H. E. Arblaster. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 71-76; discussion, p. 103-108.

Cyanide baths containing the usual double cyanide of Ag and K, free KCN and K_2CO_3 are used for the electrodeposition of Ag.

8-265. German Electroplating Practice. A. W. Wallbank. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 83-90; discussion, p. 103-108.

Tours were made of Western Germany after V.E. Day. Findings of the investigations were originally published as B.I.O.S. Reports.

8-266. Factors Affecting the Internal Stress in Electrolytically Deposited Copper. J. Van Der Sommen. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 95-98; discussion, p. 103-108.

Method for measuring internal stress in electrodeposited metals. Influence of base metal; surface condition; pretreatment of the Cu solution, acid content and Cu content; metallic ions; and organic additions in the Cu solution.

8-267. Porous Chrome Plating of Cylinder Bores by the Van Der Horst Method. C. D. B. Williams. *Proceedings of the Third International Con-*

ference on Electrodeposition, 1948, p. 99-101; discussion, p. 103-108.

See previous abstract from *Engineering*, item 8-48, 1948.

8-268. The Effect of Operating Conditions on the Throwing Power of Cyanide Cadmium Plating Solutions. P. Baeyens. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 109-112; discussion, p. 151-155.

Limits of temperature and current density for high throwing power.

8-269. Heavy Nickel Depositions as a Manufacturing Operation. S. Wernick and F. Willetts. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 113-120; discussion, p. 151-155.

Previously abstracted from *Metal Finishing*. See item 8-242, 1948.

8-270. Alloy Deposition From Sulphamate Baths. R. Piontelli and L. Canonica. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 121-125; discussion, p. 151-155.

Results of experiments on Ni-Co, Pb-Sn, and Cd-Zn alloys. Baths based on salts of sulfamic acid (NH_2SO_3H).

8-271. Electrodeposition of Metallic Coatings on Magnesium Alloys. R. R. Rogers and M. L. Boyd. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 127-130; discussion, p. 151-155.

Previously abstracted from *Sheet Metal Industries*. See item 8-116, 1948.

8-272. The Electrodeposition of Tungsten Alloys Containing Iron, Nickel and Cobalt. Abner Brenner, Polly Burkhead, and Emma Seegmiller. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 131-146; discussion, p. 151-155.

Previously abstracted from the *Journal of Research of the National Bureau of Standards*. See item 8-172, 1947.

8-273. Experiences With the Rochelle Copper Plating Solution. N. A. Tope. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 147-150; discussion, p. 151-155.

Plating conditions, blistering troubles, influence of anode area, and exact influence of pH value.

8-274. The Influence of the Basis Metal in Electroplating. R. Piontelli. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 157-163; discussion, p. 209-213.

Previously abstracted from *Sheet Metal Industries*. See item 8-180, 1947.

8-275. The Mechanism of Exfoliation of Electrodeposited Surfaces. A. T. Steel. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 165-177; discussion, p. 209-213.

Reactions of surfaces to various physical and chemical treatments.

8-276. The Structure of Thick Chromium Electrodeposits. J. J. Dale. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 185-194; discussion, p. 209-213.

See previous abstract from *Sheet Metal Industries*, item 8-83, 1948.

8-277. The Brightening Action of Organic Sulphonates in Bright Nickel Plating. G. E. Gardam. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 203-207; discussion, p. 209-213.

Previously abstracted from *Sheet Metal Industries*. See item 8-108, 1948.

8-278. The Role of Cathode Potential in Electrolytic Alloy Deposition: Experiments on Copper-Zinc Alloys. T. Banerjee. *Proceedings of the Third International Conference on Electrodeposition*, 1948, p. 195-201; discussion, p. 209-213. 19 ref.

Data on the deposition of brass. Influence of the Cu:Zn ratio in the electrolyte, concentrations of NaCN, caustic soda, Na_2CO_3, NH_3, and $NaHCO_3$; pH of the solution and effects of addition agents, current density, temperature, and agitation. 19 ref.

8-279. The Mechanism of Electrode Processes in Aqueous Solutions. A. Hickling. *Quarterly Reviews*, v. 3, no. 2, 1949, p. 95-125.

122 references.

8-280. A Report on Recent Research in Electrolytic Polishing. P. Michel. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2175-2189.

Theory, different polishing baths and their testing, factors influencing polishing, after-treatment of polished pieces, macrostructure of the surfaces, mounting arrangements and anode and cathode assemblies for differently shaped pieces. (To be continued.)

8-281. The Electrodeposition of Molybdenum Alloys. H. J. Seim and M. L. Holt. *Journal of the Electrochemical Society*, v. 96, Oct. 1949, p. 205-213.

New aqueous citrate plating bath for electrodeposition of alloys of Mo with Co, Fe, and Si. Experimental results show effect of bath pH, concentration of sodium molybdate, and cathode current density on performance. 19 ref.

8-282. A High-Efficiency Anode for Alkaline Tin-Plating. The Effect of Alloying Constituents on the Anodic Behavior of Tin in Alkaline Stannate Solutions. Frederick A. Lowenheim. *Journal of the Electrochemical Society*, v. 96, Oct. 1949, p. 214-225.

By incorporating up to about 1% Al in the tin anodes used in alkaline tin plating, current densities obtainable can be markedly increased. The effect of 26 elements upon the anode behavior of tin in alkaline solutions. Many have little effect; some, such as Ni, Ag, Cd, and In, have a strong passivating action. 10 ref.

8-283. Über die Porosität und Bildungsgeschwindigkeit von Elektrophosphatschichten. (Porosity and Formation Rate of Electrophosphate Films.) W. Machu. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 278-281.

Proves that a.c. treatment accelerates the bonderizing action even in baths which already contain powerful accelerators. The slightly greater porosity of electrophosphate films is explained and it is suggested that such films may have a greater protective effect than other types. 14 ref.

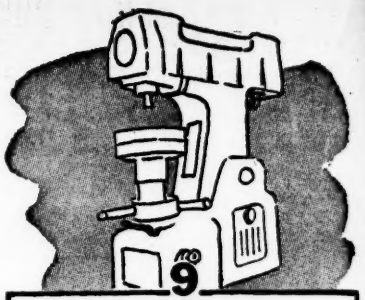
8-284. Manganphosphatschichten aus dem Kurzzeitbad. (Manganese Phosphate Films From the "Short-Time" Bath.) W. Machu. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 283-286.

The rate of formation and porosity of phosphate films produced by NO_3-containing Mn-phosphate baths was investigated by an electrochemical method. Results show that a fresh bath will result in greater porosity than a used bath. Treating the bonderized metal in a chromate bath further increases its already good corrosion resistance.

8-285. (Book) Proceedings of the Third International Conference on Electrodeposition. 219 pages. 1948. The Electrodepositors' Technical Society, 27 Islington High St., London, N.1, England. £2, 10s. to nonmembers.

Twenty-three papers, separately abstracted.

For additional annotations indexed in other sections, see: 3B-219; 7A-150; 7D-54-55-56; 10C-143; 15-66; 19B-201



9 PHYSICAL and MECHANICAL TESTING

9-267. A Quench Cracking Susceptibility Test for Hollow Cylinders. Cyril Wells, C. F. Sawyer, I. Broverman, and R. F. Mehl. *American Society for Metals*, Preprint No. 13, 1949, 28 pages.

Notched specimens 6.5 in. o.d., 2.75 in. i.d., and 0.5 in. thick are spray-quenched in a special way, and minimum depth of notch required to crack specimens is determined. The minimum varies inversely with cracking susceptibility. As an index of cracking susceptibility, the test is already extensively employed in a variety of studies. Possible modifications to increase range of usefulness. 15 ref.

9-268. A Bar Bend Test and Its Application to Stainless Steel. C. A. Zapffe, R. L. Phebus, and F. K. Landgraf. *American Society for Metals*, Preprint No. 24, 1949, 20 pages.

Bend-testing machine for rod and bar based on the principles of the single-bend constant-rate test previously described for wire. An exploratory survey of most of the standard grades of commercial stainless steels discloses those compositions and conditions which are sensitive to the test. Results for types 403, 410, 414, 416, 420, 431, 440-B, and 440-C. Behaviors are illustrated for retained austenite, secondary hardening, and retempering. Rockwell hardness readings are also compared with the bend plots.

9-269. Investigation of Square Sub-Sized V-Notched Charpy Specimens. Donald C. Buffum. *ASTM Bulletin*, Sept. 1949, p. 45-47.

Impact data over a range of temperatures are presented for standard and for several subsized specimens. Data are for one steel which has been given a single heat treatment. Effects of reduction in cross-sectional area and of small changes in the notch upon temperature of transition from ductile to brittle fracture.

9-270. A Torsion Testing Machine of 2,000,000 Inch-Pound Capacity. F. K. Chang, K. Endre Knudsen, and Bruce G. Johnston. *ASTM Bulletin*, Sept. 1949, p. 49-52.

Machine designed and constructed at Lehigh University. It can test specimens up to 4 ft., 4 in. in diameter by 16 ft. long; and can apply twists through any desired angle.

9-271. The Creep of a Nominally Isotropic Aluminium Alloy Under Combined Stress Systems at Elevated Temperatures. A. E. Johnson. *Metallurgia*, v. 40, July 1949, p. 125-139.

Creep, plastic strain and relaxation tests at high temperatures, and under general stress systems being carried out in the National Physical Laboratory, England. Tests were performed on Al (R.R.59) alloy at 150 and 200° C. Results are analyzed and equations for the stress-strain relations are derived. 16 ref.

9-272. Fatigue Tests of Spot-Welded Steel Sheets. Georges Welter. *Welding Journal*, v. 28, Sept. 1949, p. 414s-438s.

Comprehensive review of a series of fundamental experiments to determine the method of fatigue failure of spot welds in mild and stainless steel sheets.

9-273. The Static Notch-Bar Tensile Test. G. Fitzgerald. *Aircraft Engineering*, v. 21, Sept. 1949, p. 301.

A series of tests on four different steels enables a comparison to be made between the static notched-bar tensile test figures and tensile strength and Brinell hardness figures obtained on standard machines.

9-274. Metal Hardness Tests. [A. P. Gulyaev and R. I. Mitel'berg.] *Chemical Age*, v. 61, Sept. 3, 1949, p. 323-324.

Previously abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory). See item 9-194, 1949.

9-275. The Theory of Ultrasonic Materials Testing. H. E. Van Valkenburg. *Mechanical Engineering*, v. 71, Oct. 1949, p. 817-820.

Basic characteristics of ultrasonic waves. Potentialities and limitations of application to materials testing. 13 ref.

9-276. Analyzing Mechanical Failures. Kenneth N. Mills. *Product Engineering*, v. 20, Oct. 1949, p. 114-118.

Analysis procedures and latest equipment for testing materials as basis for sound practice in part design. Photo-elastic analysis and bearing failure analysis.

9-277. Buckling of Uniform and Stepped Columns. I. J. H. Meier. *Product Engineering*, v. 20, Oct. 1949, p. 119-123.

Procedure for more accurate analysis than is obtained with handbook formulas. Application to cylinder and piston-rod assemblies.

9-278. The Development of a Permanent Mold for Aluminum Tensile Test Bars. L. J. Ebert, R. E. Spear, and G. Sachs. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 315-330; discussion, p. 330-333.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-13. See item 9d-4, 1948.

9-279. Can Castings Be Engineered? F. G. Tatnall. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 452-456; discussion, p. 456-457.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-45. See item 24a-109, 1948.

9-280. A Fluidity Test for Aluminum Casting Alloys. W. E. Sicha and R. C. Boehm. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 502-506; discussion, p. 506-507.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-34. See item 9d-3, 1948.

9-281. Production Hardness Testing in a Malleable Shop. C. Schneider and L. Ulsenheimer. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 580-584; discussion, p. 584-585.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-25. See item 9b-25, 1948.

9-282. Application of the Brinell Test in the Foundry. J. Léonard. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A211-A213; discussion, p. A213-A214.

Previously abstracted from *Foundry Trade Journal*. See item 9b-39, 1948.

9-283. Creep. P. S. Wakefield. *Machinery Lloyd* (Overseas Edition), v. 21, Sept. 24, 1949, p. 68-69, 71, 73.

Phenomenon of creep, its testing, and practical applications of creep-test results.

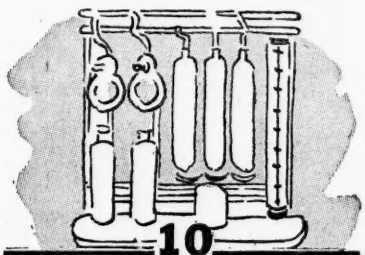
9-284. What Do Materials Tests Really Tell the Designer? H. W. Gillett. *Machine Design*, v. 21, Oct. 1949, p. 96-102, 154.

Limitations of the various materials test data for predicting actual service behavior. No single test gives wholly reliable design indications. The engineer must still exercise engineering judgment. Tendency toward use of simulated service tests.

9-285. Werkstoffprüfung und Festigkeitsberechnung (Gestaltfestigkeit). (Materials Testing and Strength Calculations—Design Stability.) G. Fiek. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 271-273.

Assumptions of uniform distribution of stresses as determined on simple geometrical test bars are found to be erroneous when the shape of structural parts is altered by notches, holes, and changes in their cross-sections. Test results have shown that the strength properties of a given material depend not only on its composition, phase structures, etc., but also on its shape, size, and surface condition. 14 ref.

For additional annotations indexed in other sections, see: 3B-204-205-209-223; 3D-68; 20A-440; 22B-356



10 ANALYSIS

10A—General

10A-130. Determination of Oxygen in Metals by the Vacuum Fusion Method. R. K. McGeary, J. K. Stanley, and T. D. Yensen. *American Society for Metals*, Preprint No. 10, 1949, 16 pages.

An improved type of vacuum-fusion apparatus for determination of total oxygen in metals, and its operation. The apparatus is capable of analyzing samples weighing 0.1-2 g. and the operator can run samples in 15-20 min. each with an accuracy of about ±0.001%. 14 ref.

10A-131. Quantitative Inorganic Paper Chromatography. Sub-Micro Separation and Determination of Aluminium, Iron and Titanium. A. Lacourt, G. Sommereyns, E. Degeyndt, J. Barugh and J. Gillard. *Metallurgia*, v. 40, July 1949, p. 181-182.

10A-132. Gas Evolution From Weld Metal Deposits. I. L. Stern, J. Kalinsky, and E. A. Fenton. *Welding Journal*, v. 28, Sept. 1949, p. 405s-413s.

Importance of measuring rates and quantities of hydrogen evolved and improved methods for determination. 19 ref.

10A-133. Direct Spectrochemical Analysis of Solutions Using Spark Excitation and the Porous Cup Electrode. Cyrus Feldman. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1041-1046.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-2392. See item 10A-54, 1949.

10A-134. Determination of Cottonseed Oil on Tin Plate. J. G. Donelson and R. A. Neish. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1102-1104.

The majority of tin plate produced by the continuous electrotinning process is lubricated with edible grade cottonseed oil in order to inhibit oxidation of the plate during storage and to provide some degree of lubrication for subsequent forming operations. Improved technique for its determination.

10A-135. Direct Determination of Chromate Ion With Standard Arsenite and Diphenylamine as Indicator. Zoltan Szabo and Ladislaus Csanyi. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1144-1145.

Use of the above for determination of Cr in steel.

10A-136. Rapid Analysis. Walter Bonsack. *Metal Progress*, v. 56, Oct. 1949, p. 488-489.

Operation results of the Quantometer. It has speeded composition determination with increased accuracy at the Apex Smelting Co.

10A-137. Automatic Recording of Titrations. J. M. Gonzalez Barredo and John Keenan Taylor. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 437-444.

Previously abstracted from Preprint 92-26. See item 10-227, 1947.

10A-138. Automatic Potentiometric Titrations. H. A. Robinson. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 445-464; discussion, p. 464.

Application of the potentiometric method to both analytical and general research work. Automatic apparatus developments, and an instrument capable of automatically performing and plotting potentiometric titrations, and adaptable to a variety of electrode systems. Construction and operating principles as well as calibration, method of use, and performance characteristics.

10A-139. The Absorptiometric Determination of Traces of Metals. Reversion: A New Procedure. Harry Irving, E. J. Risdon, and Geoffrey Andrew. *Journal of the Chemical Society*, Mar. 1949, p. 537-541.

Factors influencing accuracy with which metals can be determined absorptiometrically after extraction by an immiscible organic phase as complexes. Existing procedures are shown to fail when adventitious light-absorbing materials derived from the analytical sample are absent in the control determination. New procedure in which a single calibration curve serves for determination of a number of metals with dithizone.

10A-140. Spectrochemical Analysis; Technique for Determining Composition From Alloy Solutions. G. S. Smith. *Metal Industry*, v. 75, Sept. 30, 1949, p. 267-268.

Special apparatus and solution technique recently described by Russian investigators. The apparatus, which is known as a "fulgurator" permits direct determination of the composition of alloy solutions at a rate of 30 per hr. Similar apparatus used for determination of trace elements.

10B—Ferrous

10B-76. Note on Donaldson's Method for Determining Combined Carbon in Malleable Iron. H. A. Schwartz and G. M. Guiler. *American Foundryman*, v. 16, Sept. 1949, p. 53.

Modification of the original method, which gave inaccurate results when used on malleable iron.

10B-77. Magnesium in Cast Iron. W. R. Kennedy. *Foundry*, v. 77, Oct. 1949, p. 80-81, 182.

A recent method for causing nodular graphite structure in cast iron has made necessary a rapid and reliable method for determining its Mg content. Standards were obtained from experimental heats in the form of ½-in. diameter cast pins. Samples were analyzed by wet chemical methods. Procedure.

10B-78. Semiquantitative Spectral Analysis of Cast Irons. W. J. Price and A. Argyle. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 49-59.

A method of rapid estimation of traces and impurities. Line-pairs suitable for estimations, and methods of calibration.

10B-79. Determination of Carbon in Coarse Graphite Materials. W. Westwood and F. A. Hooper. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 61-66.

Ordinary combustion, direct combustion, and the copper potassium chloride method. The first was found to be entirely unsatisfactory for coarse graphite materials. The other two are satisfactory when applied to solid samples of steel castings which have been carefully prepared.

10B-80. Melting Control With the Direct-Reading Spectrometer. Earl R. Vance. *Journal of Metals* (News Section), v. 1, Oct. 1949, p. 28-30.

Results of 2 years experience at Timken Roller Bearing Co.

10B-81. Gases in Cast Iron. J. E. Hurst and R. V. Riley. *Foundry Trade Journal*, v. 87, Sept. 29, 1949, p. 393-397; discussion, p. 397-400.

Results of experiments on the hot extraction method of gas analysis.

10B-82. Atomic Scientist's Aid Finds New Job Counting Alloy Factors in Steel. *Welding Journal*, v. 28, Oct. 1949, p. 465s, 483s.

New technique in which the Geiger counter is used for qualitative and quantitative analysis of steel. The steel atoms are ionized by intense X-rays. They then emit fluorescent rays which are detected by the Geiger counter.

10C—Nonferrous

10C-133. Electrolytic Separation of Rhodium From Iridium at Controlled Cathode Potential. William Marshall MacNevin and Samuel Miller Tuthill. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1052-1054.

Successfully accomplished using a circuit of the Lingane type. Adaptation of the separation to the Gilchrist-Wichers scheme for the Pt group metals. 11 ref.

10C-134. Analysis of Beryllium-Copper Alloys. Emma E. Baskerville. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1089-1091.

Cu is first removed and discarded. Be is generally determined first in the remaining solution, except when samples contain P or Zr, which must be removed. Ni and Co are determined in the solution after Be removal. Special modifications are used for Si and Cr. Ag is determined gravimetrically. 10 ref.

10C-135. Determination of Uranium (VI) in Presence of Anions; Ammonium Thioglycolate as a Colorimetric Analytical Reagent. W. H. Davenport, Jr., and P. F. Thomason. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1093-1095.

Previously abstracted under similar title from *U. S. Atomic Energy Commission*, AECD-2398. See item 10C-94, 1949.

10C-136. Colorimetric Determination of Columbium and Tungsten in High-Temperature Alloys. Isidore Geld and Jacob Carroll. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1098-1101.

Cb is determined as the yellow percolumbic acid produced by the action of H_2O_2 upon solutions of Cb in concentrated H_2SO_4. W is determined as the yellow thicyanate resulting from the action of $SnCl_2$ and KCNS upon solutions of tungsten. Interferences of other elements found in high-temperature alloys. 20 ref.

10C-137. Amperometric Titration. Part IV. Some Preliminary Experiments on the Use of 8-Hydroxyquinoline. J. T. Stock. *Metallurgia*, v. 40, July 1949, p. 179-180; Aug. 1949, p. 229-230.

By use of small cells, milligram and microgram quantities of Cu, Zn, and Cd may be titrated with the above solution. The titration curve for Cu retains its shape for metal concentration as low as 1×10^{-4} M. Low solubility of its complex permits the titration of Cu in the presence of Cd but in the presence of Zn, coprecipitation occurs, as it does in Zn-Cd mixtures. Titration of Cd alone, or in the presence of Cu or Zn.

10C-138. The Estimation of Oxygen in Metals by Hydrogen Reduction. W. A. Baker. *Metallurgia*, v. 40, Aug. 1949, p. 188-189.

Modified British Non-Ferrous Metals Research Association apparatus to increase accuracy and speed of the above.

10C-139. Inorganic Paper Chromatography: the Qualitative Separation of Aluminium and Beryllium. G. H. Osborn and A. Jewsbury. *Nature*, v. 164, Sept. 10, 1949, p. 443-444.

10C-140. An Improved Method for Determination of Milligram Quantities of Vanadium in the Presence of Uranium. R. H. Gale and Eve Mosher. *U. S. Atomic Energy Commission*, AECD-2662, Aug. 3, 1949, 9 pages.

Method utilizes the reduction of quinquevalent vanadium to the vanadyl ion by ferrous ammonium sulfate. Accurate and precise determination of the equivalence point in this titration is made possible by use of a modified dead-stop titration apparatus and a micro-weight burette. 19 ref.

10C-141. A Laboratory-Cast Pin Sample for the Spectrographic Analysis of Copper-Base Alloys. E. W. Palmer, J. P. Irwin, and C. C. Fogg. *ASTM Bulletin*, Sept. 1949, p. 41-45.

Practical and inexpensive method developed for preparing pins of standard size and shape from any form of metallic sample (wire, sheet, heavy bars, drillings, etc.) received for spectrographic analysis by a brass-mill laboratory. The sample is reduced to fine chips, and a small portion remelted under argon in a specially designed graphite crucible which serves as the mold for the sample. Pins are machined to dimensions that vary with the excitation to be used and the elements to be determined.

10C-142. The Chromatographic Separation of Perrhenic and Molybdic Acids. Guy B. Alexander. *Journal of the American Chemical Society*, v. 71, Sept. 1949, p. 3043-3046.

Quantitative separation of Re and Mo can be made using Norit as adsorbent.

10C-143. Determination of Impurities in Electroplating Solutions. XIV. Traces of Calcium in Nickel Plating Baths. *Plating*, v. 36, Oct. 1949, p. 1034-1035, 1038-1040.

Apparatus and procedure. Accuracy and precision of method. 25 ref.

10C-144. Analysis of Oxygen in Titanium. Gerhard Derge. *Journal of Metals* (News Section), v. 1, Oct. 1949, p. 31-33.

A modification of the vacuum fusion techniques used for the analysis of gases in steel.

10C-145. Rapid Determination of the Calcium Content of Lead-Calcium Alloys by Titrating in the Molten State With Metallic Antimony. G. M. Bouton and G. S. Phipps. *Transactions of the Electrochemical Society*, v. 92, 1947, p. 305-311.

Previously abstracted from Preprint 92-13. See item 10-195, 1947.

10C-146. Steric Hindrance in Analytical Chemistry. Part I. Harry Irving, E. J. Butler, and M. F. Ring. *Journal of the Chemical Society*, June 1949, p. 1489-1498.

A series of quinoline and acridine derivatives was prepared and tested as potential precipitating agents in metal analysis and compared with the commonly used 8-hydroxyquinoline. Differences in behavior with Al explained in stereochemical terms.

10C-147. Studies in the Analytical Chemistry of Tungsten. IV. Separation of Tungstic and Arsenic Acids. D. A. Lambie. *Analyst*, v. 74, July 1949, p. 405-410.

Results of a critical study of methods for separation and determination of tungstic and arsenic acids. 12 ref.

10C-148. Metallo-Organic Reagents Used in Micro-Analysis. I. The Determination of Bismuth and Cadmium. F. Lester. *Metallurgia*, v. 40, Sept. 1949, p. 285-286.

Reagents and procedures. 18 ref.

10C-149. Visual Arc Spectroscopic Detection of Halogens, Rare Earths and Other Elements by Use of Molecular Spectra. Howard W. Jaffe. *American Mineralogist*, v. 34, Sept.-Oct. 1949, p. 667-674.

Cl, F, Br, Y, Sc, La, B, Al, Be, Ca, and Zr may be detected in minerals by visual arc spectroscopic observation of molecular or band spectra. The versatility of the simple bunsen spectroscope is greatly enhanced through application of molecular spectroscopy. A reference chart shows the most characteristic spectra of the visible region. 10 ref.

10C-150. Rapid Method for Determining Nickel on the Surface of Enameling Iron. L. C. Ikenberry and J. J. Canfield. *Journal of the American Ceramic Society*, v. 32, Oct. 1, 1949, p. 308-312.

Method requiring less than 5 min. Standard deviation was found to be 0.0028 g. of Ni per sq. ft. when testing a sheet carrying 0.10 g. per sq. ft.

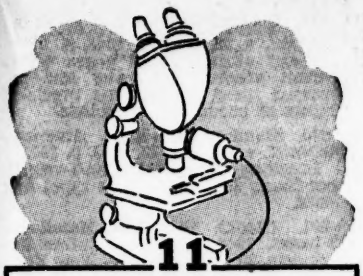
10C-151. Über eine neue Zinkbestimmung auf photometrischem Wege. (A New Method of Determining Zinc by a Photometric Method.) W. Biberschick. *Metall*, v. 3, Mar. 1949, p. 80-82.

Working directions for a new indirect method using the Pulfrich step photometer. Proposed method is suitable for rapid analysis of alloys, especially of light-metals.

10D—Light Metals

10D-33. Spectrographic Determination of Impurities in Beryllium and Its Compounds. A. Lee Smith and Velmer A. Fassel. *Analytical Chemistry*, v. 21, Sept. 1949, p. 1095-1098.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-2100. See item 10D-5, 1949.



11

APPARATUS, INSTRUMENTS and METHODS

11-317. Methods of Determining Vapor Pressure of Metals. Rudolph Speiser and H. L. Johnston. *American Society for Metals*, Preprint No. 11, 1949, 26 pages.

Various methods, in particular, the theory and practice of the Langmuir evaporation method and the Knudsen effusion method. Vapor-pressure equations used to represent experimental data, and methods of calculating thermodynamic functions from vapor pressures, heat capacities, and spectroscopic data. 23 ref.

11-318. Preparation of Metal Single Crystals. A. N. Holden. *American Society for Metals*, Preprint No. 35, 1949, 29 pages.

Basic processes and their numerous variations used to grow or form metal single crystals. Experimental difficulties encountered with the various methods. Methods of growing crystals of desired orientations are included. 159 ref.

11-319. Application of Automatic Control to Open-Hearth Furnaces. E. Whitehead. *Journal of the Iron and Steel Institute*, v. 163, Sept. 1949, p. 1-8.

Some of the factors which require automatic control. Why priority is given to air-fuel ratio, furnace pressure, roof temperature, and reversal. Attention is drawn to some major sources of error. Basic principles of automatic control presented in a simple nonmathematical way.

11-320. Das Walzdruckmessgerät mit induktiver Feinmesslehre. (Rolling-Pressure Measuring Instruments With Inductive Micrometer Gages.) Norbert de Ball. *Archiv für technisches Messen*, Dec. 1948, p. T118-T119 (4 pages).

Various types of instruments used to measure applied pressures when rolling metals and nonmetals. 11 ref.

11-321. Method of Production of Replicas of Definite Submicroscopic Areas of Solid Surfaces. (In Russian.) I. I. Tret'yakov and A. B. Shekhter. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 11, 1949, p. 231-233.

Method is particularly important in electron microscopy.

11-322. Technical Factors in Testing Pipe Line Coatings. D. E. Stearns, M. W. Belson, and Robert H. Lee. *Corrosion*, v. 5, Oct. 1949, p. 342-346.

Development of the holiday (defect in coating) detector in its present form.

11-323. Surface Reproduction. Utilization of the Pressure Effect of Photographic Emulsions. K. B. Mather. *Metal Industry*, v. 75, Sept. 16, 1949, p. 227-228.

Previously abstracted from *Metal Progress*. See item 11-274, 1949.

11-324. New Test Predicts Deep Drawing Properties of Steel Sheet. Kenneth Rose. *Materials & Methods*, v. 30, Oct. 1949, p. 62-63.

How drawability of steel is quickly and accurately indicated by the torque magnetometer, developed by U. S. Steel.

11-325. Cathodic Vacuum Etching Applied To Metal Surface Examination. *Modern Machine Shop*, v. 22, Oct. 1949, p. 182-184.

New etching process to prepare metal surfaces for microscopic examinations and photography. The method, developed by the Ford Motor Co., utilizes ionized atoms.

11-326. Note on Some Plastic Flow Effects in Steel. R. Loojes and H. J. Vink. *Journal of Applied Physics*, v. 20, Sept. 1949, p. 884-885.

A method, using interference fringe measurements, for studying deflections occurring in simple cases of plastic flow in steels.

11-327. Metallographic Examination of Beryllium Alloys. M. C. Udy, G. K. Manning, and L. W. Eastwood. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 779-784.

Development of a reasonably satisfactory technique for identifying 14 different phases in various alloys of beryllium.

11-328. A Survey of Sieve Series and Grade Scales. Robert E. Morey. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 286-296; discussion, p. 296.

Existing sieve series and grade scales for determining particle size of particulate materials. Good and bad points of the various scales. Proposes a grading system which combines the best features of existing systems to produce a uniform system which may be acceptable to all who measure and control particle sizes in science and industry. 35 ref.

11-329. Metallographic Technique for Mounting Porous Compacts. R. Wach-

tell. *Powder Metallurgy Bulletin*, v. 4, Sept. 1949, p. 126-128.

11-330. How to Measure Surface Roughness of Castings. G. Hobman. *American Foundryman*, v. 16, Oct. 1949, p. 46-47.

Use of dial gage and stylus-type contact point.

11-331. New Machine Evaluates Blasting Material Life. *SAE Journal*, v. 57, Oct. 1949, p. 45-47.

Machine that tests blast cleaning shot and abrasives, producing an effect comparable to actual blasting operations. Data for common materials.

11-332. X-Ray Powder Diffraction Analysis Film and Geiger Counter Techniques. William Parrish. *Science*, v. 110, Oct. 7, 1949, p. 368-371. A condensation.

A few new techniques and instrumentations developed at Philips Laboratories, Irvington-on-Hudson, N. Y., during past 6 years. 12 ref.

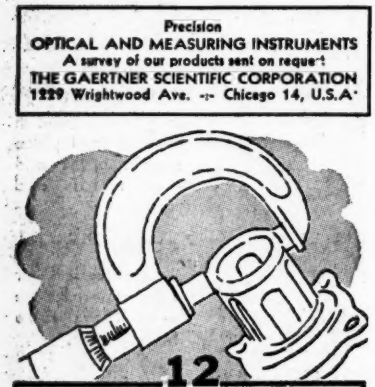
11-333. Two Radioactive Methods for Studying Certain Gas-Metal Reactions. Clifford K. Beck. *Science*, v. 110, Oct. 7, 1949, p. 371-372. A condensation.

Techniques have proved useful and convenient in studying rate, time dependence of rate, total magnitude of reactions, and certain properties of deposited films.

11-334. Study of Adherence of Molten Glass to Heated Metals. J. A. Kapnicky, H. V. Fairbanks, and W. A. Koehler. *Journal of the American Ceramic Society*, v. 32, Oct. 1, 1949, p. 305-308.

Kinetic test for evaluating this adherence. Results are expressed in terms of the highest metal temperature at which a drop of molten glass shows no adherence. This temperature was determined for several cast irons and nonferrous metals and alloys. It is affected by structure and surface roughness. Effects of cyaniding, carburizing, nitriding, quenching, and annealing were also determined as well as general effect of mold lubricants on adherence temperature.

For additional annotations indexed in other sections, see:
4A-113; 20A-421; 22A-229



12 INSPECTION and STANDARDIZATION

12-186. Statistical Methods for Evaluating the Quality of Certain Wrought Steel Products. Edwin G. Olds and Cyril Wells. *American Society for Metals*, Preprint No. 16, 1949, 47 pages.

The importance of the frequency distribution for summarizing data. Utilization of certain parameters to characterize the central tendency and dispersion of frequency distribution. Examples illustrate the meaning of some "tests of significance" developed by statisticians. 47 ref.

12-187. Master Measuring System Checks Jet-Engine Blades. Dan White and Henry Meltzer. *American Machinist*, v. 93, Sept. 22, 1949, p. 91-95.

How a modified toolmaker's microscope can measure curved surfaces of turbine blades within ± 0.0003 in.

12-188. Nickel Alloy Steel Castings to British Standard Specifications Nos. 1458 and 1459. *Nickel Bulletin*, v. 22, May 1949, p. 70-74.

Scope and potentialities of alloy steel castings; specification features of particular interest to designer, founder and user; and recommended Ni alloy steel-casting compositions appropriate to meet specification requirements.

12-189. A Survey of Car Body Production Methods at Vauxhall Motors Ltd. Maurice J. Seymour. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1947-1948.

Inspection procedure.

12-190. Brazed Tool-Tips: Non-Destructive Testing Method Developed by the Bristol Aeroplane Co., Ltd. *Aircraft Production*, v. 11, Sept. 1949, p. 295-297.

Galvanometer setup for testing the adhesion of brazed joints in tipped milling-cutters. The system is adaptable for checking almost any type of brazed joint or other thin metallic film.

12-191. Railroad Track Inspection Car. Robert D. Walker, Jr. *Electronics*, v. 22, Oct. 1949, p. 66-68.

Self-propelled mobile laboratory which permits nondestructive inspection of railroad tracks. Special generator passes large currents through rails and search coils detect internal flaws which are accompanied by nonuniformities in the magnetic field surrounding the railhead.

12-192. The Case of the Perjured Control Chart. V. E. McCoun. *Tool & Die Journal*, v. 15, Oct. 1949, p. 54-57. Reprinted from *Industrial Quality Control*, v. 5, no. 6.

Charted results of study of an automatic multiple-tool lathe operation show the value of a continuous chart of consecutive parts from an operation and the desirability of deliberately staggering the time interval between samples to a greater extent than is usually considered necessary.

12-193. Achieving Quality Control Through Statistical Methods Plus Tool Control. *Tool & Die Journal*, v. 15, Oct. 1949, p. 58-60, 62.

Methods used at G. E.'s automatic washer plant.

12-194. Quality Control at Lamson and Sessions. Charles R. Kendel. *Tool & Die Journal*, v. 15, Oct. 1949, p. 72, 74, 76, 97.

12-195. Quality Considerations in Designing and Producing Grinding Machine Ways. *Tool & Die Journal*, v. 15, Oct. 1949, p. 82, 84-85.

12-196. Magnaglo Inspection Before Machining Saves Costs. *Automotive Industries*, v. 101, Oct. 1, 1949, p. 36-37.

Magnaflux unit and its operation at Willys-Overland for inspecting a large variety of forgings. Detects defects before parts enter the machine shop.

12-197. The Value of Pressure Tests and Radiographs of Gun Metal Castings. W. H. Baer. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 355-361; discussion, p. 360, 362.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-43. See item 11-98, 1948.

12-198. Industrial Applications of Radiography in the Inspection of Welds. L. Mullins. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2193-2206.

Extensive details of procedures and applications. 29 ref.

12-199. Light Gages Check External Tapers. Bernard R. Better. *American Machinist*, v. 93, Oct. 20, 1949, p. 76-77.

Easily constructed gages which permit greater accuracy and increased speed in checking precision tapers of production machines.

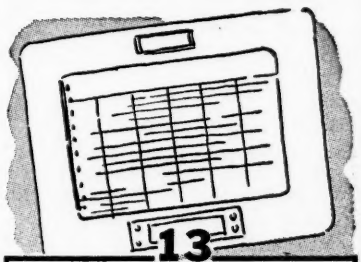
12-200. Standard Wire Rope. *American Machinist*, v. 93, Oct. 20, 1949, p. 125.

Breaking-strength data and weights per linear foot for various types and sizes.

12-201. (Book) 1949 SAE Handbook. 933 pages. 1949. Society of Automotive Engineers, 29 West 39th St., New York. $10.00. ($5.00 to members.)

Extensively revised. 31 new automotive standards and specifications have been added, and 9 have been cancelled. Standardized for the first time is a series of alloy steels that may be bought to hardenability specifications.

For additional annotations indexed in other sections, see:
14C-78; 19A-236; 19D-60



13 TEMPERATURE MEASUREMENT and CONTROL

13-58. The Tungsten-Iridium Thermocouple for Very High Temperatures. Walter C. Troy and Gary Steven. *American Society for Metals*, Preprint No. 19, 1949, 20 pages.

Operating between 1600 and 2000° C., calibrations were made for thermocouples representing combinations of W, Mo, Ta, Pt, Rh, Ir, and alloys of these metals. In a neutral atmosphere, optimum properties and performance were obtained with the W-Ir thermocouple. Table lists the computed emf. for temperatures between 1000 and 2100° C. for this couple.

13-59. Temperature Measurement in Basic Arc Furnace. C. B. Post and D. G. Schoffstall. *Journal of Metals* (News Section), v. 1, Oct. 1949, p. 12-17.

Experience at Carpenter Steel Co. with the optical pyrometer (1926-1947), the immersion thermocouple (1946-1948), and the Leeds & Northrup immersion Rayotube. Modification and application of the immersion Rayotube.

13-60. Optical Temperature Scale and Emissivity of Liquid Iron. Minu N. Dastur and Nev. A. Gokcen. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 665-667.

Results of true and apparent optical temperature readings are plotted. Procedure for evaluating transmissivity and emissivity values from such a scale. 20 ref.

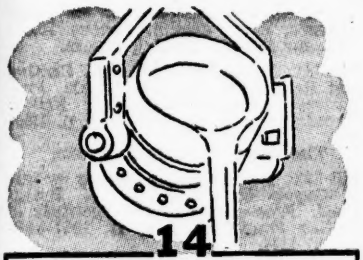
13-61. Controlling Temperature in Hot Metal Working Operations. E. F. Mosthof. *Machinery* (London), v. 75, Sept. 29, 1949, p. 444-446.

Typical set-up in which a photoelectric unit is used to control temperatures. By this means, every part can be heated to the same temperature regardless of differences in wall thickness.

11-62. Dynamic Accuracy in Temperature Measurement. J. G. Ziegler and N. B. Nichols. *Science*, v. 110, Oct. 7, 1949, p. 361-363. A condensation.

Use of a derivative transmitter to achieve dynamic compensation for the inevitable lag of thermal elements. This is said to make possible a degree of speed and accuracy not previously obtained.

For additional annotations indexed in other sections, see: 2B-279; 11-319



14 FOUNDRY PRACTICE

14A—General

14A-128. Molding Sand Standardized. James J. Silk. *American Foundryman*, v. 16, Sept. 1949, p. 51-53.

Advantages of standardized sand, optimum proportion of sea coal, need for adequate venting and for periodic sand checking.

14A-129. Modern Foundry Methods. *American Foundryman*, v. 16, Sept. 1949, p. 54-56.

Unusual variation of the lost-wax process using a frozen mercury pattern instead of the traditional wax. Producing precision castings of complex form with dimensional tolerances of ±0.003 in. in 1½ in. is common. Bulk of the castings produced have been of Al-Si alloy; some stainless steel and coin-silver castings have also been made.

14A-130. Advantages Gained by Precision Casting Wide Range of Steels and Alloys. K. J. Yonker. *Materials & Methods*, v. 30, Sept. 1949, p. 82-84.

Precision casting is useful for high production of many low-cost metals as well as for fabrication of intricate parts.

14A-131. Experiences With Ethyl Silicate in the Foundry. D. F. B. Tedds. *Foundry Trade Journal*, v. 87, Sept. 1, 1949, p. 281-286; Sept. 8, 1949, p. 315; discussion, p. 315-317.

Previously abstracted from *Metal Industry*. See item 14A-106, 1949.

14A-132. Synthetic Resins in the Foundry. K. S. Meakin. *Foundry Trade Journal*, v. 87, Sept. 8, 1949, p. 307-312.

Some recent developments in core practice.

14A-133. Precision Casting of Hard-to-Machine Metals With Polystyrene Patterns. *Automotive Industries*, v. 101, Oct. 1, 1949, p. 44, 58.

Method for producing a variety of parts which cannot be made by conventional methods of forging or machining.

14A-134. Effect of Grain Shape on the Behaviour of Synthetic Core and Moulding Sands. W. J. Rees. *Foundry Trade Journal*, v. 87, Sept. 22, 1949, p. 359-366; discussion, p. 366-369.

Use of a recently developed method for the assessment of grain shape. Typical examples of effect on bonded-sand mixtures.

14A-135. Statistical Quality Control—A New Tool for the Foundryman. H. H. Johnson and G. A. Fisher. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 194-206; discussion, p. 206-207.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-7. See item 14a-71, 1948.

14A-136. Changes in Chemistry of Liquid Steel in Contact With Sand. J. B. Caine. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 260-262; discussion, p. 262-263.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-29. See item 14a-75, 1948.

14A-137. Relation of Cupola Research Progress in Cast Iron Development. R. G. McElwee. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 264.

Progress on coke-quality and slag-fluidity testing.

14A-138. A Study of Factors Affecting Pouring Rates of Castings. J. G. Mezoff and H. E. Elliott. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 279-284; discussion, p. 285.

See abstract from *American Foundryman*, item 14a-81, 1948.

14A-139. Modernization of the "Small" Foundry. Lester B. Knight. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 297-312; discussion, p. 312-314.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-53. See item 14a-79, 1948.

14A-140. Eighth Annual Report on the Investigation of Properties of Steel Sands at Elevated Temperatures. J. P. Fraser and P. E. Kyle. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 345-354.

Covers work completed during the past year at Cornell University. Part I: data on hot compressive strength vs. test temperature for six sand mixtures. Part II: results to date on studies of hot compressive strength vs. exposure time for the 4% western bentonite mixture and the 10% fire-clay mixture, each containing 5% moisture and a base sand of N. J. No. 60. These data are being analyzed in order to establish a recommended procedure for hot compressive strength tests at elevated temperatures. Part III summarizes results.

14A-141. Heat Transfer: A.F.S. Committee Report. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 363-378; discussion, p. 378-381.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-17. See item 14a-72, 1948.

14A-142. A New Permeable Metal Casting Plaster. K. A. Miericke and E. S. Johnson. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 479-485; discussion, p. 485.

New type of highly permeable gypsum metal-casting plaster. Advantages include: obtainability of any desired degree of permeability; need for complete mold dehydration eliminated; lower "burnout" temperatures possible; good mold strength in both wet and "burnout" stages; fuel and time economy; and greater operational flexibility.

14A-143. A Theoretical Approach to the Problem of Dimensioning Risers. J. B. Caine. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 492-497; discussion, p. 498-501.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-36. See item 14a-76, 1948.

14A-144. Surface Gas Pressure of Molding Sands and Cores. H. W. Dietert, H. H. Fairfield, and F. S. Brewster. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 528-535; discussion, p. 535.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-39. See item 14a-78, 1948.

14A-145. A Suggested Method for the Determination of Coke Reactivity to Carbon Dioxide at Combustion Temperatures. H. Edward Flanders. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 555-560; discussion, p. 560-562.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-37. See item 14a-77, 1948.

14A-146. Designing Strainer Cores. H. L. Campbell. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 574-575; discussion, p. 575.

Previously abstracted from *American Foundryman*. See item 14a-97, 1948.

14A-147. Core Box Designing and Rigging for Core Blowing. H. J. Jacobson. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 602-606; discussion, p. 606.

See abstract from *American Foundryman*, item 14a-138, 1948.

14A-148. The Development of Foundry Sand Control. G. L. Harbach. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B22-B32.

Previously abstracted from *Foundry Trade Journal*. See item 14c-22, 1948.

14A-149. Dry-Sand Patterns. James Timbrell. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B54-B58.

Application of sand patterns, tools required, making a connection casting, making a junction piece, and a typical repair casting.

14A-150. The Metallurgist in the Foundry. W. H. Salmon. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B82-B89.

Typical examples illustrate the ways in which metallurgists have cooperated with molders working in different metals to prevent gasholes and hot tears and to improve the surface appearance of castings.

14A-151. Problems in a Quantity Production Foundry. J. Hird. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B90-B96; discussion, p. B96-B97.

Previously abstracted from *Foundry Trade Journal*. See item 14a-58, 1948.

14A-152. Venting of Cores and Moulds. D. Killingworth. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B98-B103.

Previously abstracted from *Foundry Trade Journal*. See item 14a-90, 1948.

14A-153. The Measurement and Characteristics of Casting Fluidity. V. Kondic. *Metallurgia*, v. 40, Sept. 1949, p. 246-248.

Factors on which measurements of fluidity depend. Suggests that two tests should be developed, to determine metal fluidity or flowing power, and ability to fill a mold, respectively.

14A-154. Modern Foundry Methods. *American Foundryman*, v. 16, Oct. 1949, p. 33.

Use of downgate cores. Combination of runner cup and the downgate in a single unit makes it possible to produce downgates of uniform quality at a cost less than the combined cost of the sand pouring cup and sand downgate formerly used.

14A-155. Production Processes; Their Influence on Design. Part XLVII. Permanent-Mold Casting. Roger W. Bolz. *Machine Design*, v. 21, Oct. 1949, p. 115-121.

14A-156. Plaster Mold Casting of High Speed Impellers. Herbert Brecht. *Tool Engineer*, v. 23, Oct. 1949, p. 17-18.

Details of casting to tolerances as small as 0.005 in. and surface finishes of 30 rms., once regarded as beyond the scope of practical found-

ry operations, now being accomplished on a production basis.

14A-157. (Book) Tierras de Moldeo. (Molding Sands.) Ed. 2. J. Navarro Alcacer. 114 pages. 1949. Editorial Tecnos, S. A., Madrid, Spain.

Discusses molding sands and their properties on the basis of research undertaken at Spain's Iron and Steel Institute and the literature. Covers the properties of foundry molding sands found in Spain, the U. S., Germany, England, and France.

14B—Ferrous

14B-99. Pouring Brake Shoes in India. J. S. Gupta. *American Foundryman*, v. 16, Sept. 1949, p. 38-39.

Set of flasks whereby light castings can be made in large numbers without the necessity of using molding boxes.

14B-100. Advanced Casting Methods Expected to Result in More Economical Foundry Practice and Better Castings. *Steel*, v. 125, Oct. 3, 1949, p. 68-71, 97-98, 100, 102.

Improvements in centrifugal and centripetal casting processes have been evolved in an intensive Navy research program for developing satisfactory methods for producing shrouded steam turbine wheels cast integrally and jet engine rotors cast with and without inserted blades.

14B-101. Hitting the Bull's-Eye With Precision Castings. William A. Patzer. *Metal Progress*, v. 56, Oct. 1949, p. 520-521.

Investment casting of steel parts for the "Rifle Sport" unit solved problems encountered by the A. B. T. Manufacturing Corp.

14B-102. Sand in the Mill vs. Sand in the Mold. J. B. Caine. *Foundry*, v. 77, Oct. 1949, p. 68-70, 232-240.

Effects of variables in molding sand use, which include moisture evaporation during sand handling, ramming, evaporation after ramming, mold finishing, and washing. Studies were made using standard AFS specimens, 2 in. diameter by 2 in. long, with molten steel.

14B-103. Machine Molding of Steel Castings. (Concluded.) John Howe Hall. *Foundry*, v. 77, Sept. 1949, p. 76-77, 166, 168, 170, 172, 175, 178-179; Oct. 1949, p. 90-91, 174, 176, 179-180.

Use of roll-over and jolt-squeeze molding machines in the steel foundry, as well as use of the sand-slinger and core blowers in production of molds and cores.

14B-104. Centrifugal Casting of Cylinder Sleeves and Piston Ring Pots. *Automotive Industries*, v. 101, Oct. 1, 1949, p. 40, 58, 68.

Fabrication from iron by Centrifugal Foundry Co. Parts are shipped in the form of rough-machined castings to various manufacturers. Operations include casting, heat treating, and machining.

14B-105. Can the Carbon Content of Cast Iron Melts Be Raised? J. G. Pearce. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 33-35.

Various possibilities for raising carbon and reducing the sulfur content. The most spectacular and possibly the most expensive way is to use a basic lining in the cupola. It is concluded, however, that little can be done at present.

14B-106. Spheroidal-graphite Cast Iron, Disclosure of Production Details. W. W. Braidwood and A. D. Busby. *Foundry Trade Journal*, v. 87, Sept. 15, 1949, p. 327-334.

British experience in the treatment of gray cast iron by the introduction of magnesium, to produce castings containing graphite in spheroidal form. Production details, properties, structure, effects of annealing applications.

14B-107. Contraction and Distortion in Gray Iron Castings. E. Longden. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 36-56; discussion, p. 56.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-10. See item 14b-56, 1948.

14B-108. Causes of Rat-Tail Casting Defect. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 116-136; discussion, p. 136-137.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-15. See item 14b-57, 1948.

14B-109. Oxygen-Enriched Cupola Blasts. W. C. Wick. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 246-256; discussion, p. 256-259.

See abstract from *American Foundryman*, item 14b-70, 1948.

14B-110. Solidification Characteristics of Gray Cast Iron. J. E. Fifield and J. H. Schaum. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 382-388; discussion, p. 388.

Solidification studies were conducted by bleeding partially solidified gray iron castings and by obtaining cooling curves at various points within castings which were identical to the bled castings and which were poured simultaneously but allowed to solidify completely. Cooling curves and test specimens.

14B-111. Gating Systems for Metal Castings. W. H. Johnson and W. O. Baker. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 389-397.

Previously abstracted from *Foundry*. See item 14b-102, 1948.

14B-112. Observations on Knock-Off Risers as Applied to Steel Castings. S. W. Brinson and Joseph A. Duma. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 586-597; discussion, p. 597-601.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-9. See item 14b-55, 1948.

14B-113. Applications of Correlation in the Malleable Iron Foundry. Robert G. Seidel. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 563-566; discussion, p. 566.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-22. See item 14b-60, 1948.

14B-114. Steel Castings for Aircraft. E. J. Brown and F. Rodgers. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A95-A104; discussion, p. A104-A106.

Previously abstracted from *Foundry Trade Journal*. See item 14B-3, 1949.

14B-115. The Cleaning of Steel Castings. A. B. Lloyd. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A107-A119; discussion, p. A119-A122.

Previously abstracted from *Foundry Trade Journal*. See item 14b-109, 1948.

14B-116. Problems of Contraction and Distortion in Cast-Iron Castings. E. Longden. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A152-A163; discussion, p. A163-A165.

Previously abstracted from *American Foundrymen's Association*, Preprint No. 48-10. See item 14b-56, 1948.

14B-117. British Bathmaking Practice. A. Young. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A173-A177; discussion, p. A177-A178.

Production of porcelain-enameled cast-iron bathtubs. Includes information on metal composition and enameling practice.

14B-118. The Manufacture of Some Large Castings for Marine Engineering. D. H. Young. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B8-B17.

14B-119. Practical Aspects of Machine Moulding. J. H. Peers. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B18-B21.

A general discussion.

14B-120. The Loam Moulding of Rope-Barrel Castings. D. Robertson. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B45-B52; discussion, p. B52-B53.

Procedures for casting of cable drums, each weighing about 25,000 lb., for 150-ton floating cranes.

14B-121. Precision Investment Casting and Its Future. D. F. B. Tedds. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B59-B66.

The process; future prospects.

14B-122. The Constant-Charge System of Cupola Operation. W. W. Braidwood. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B67-B74.

Previously abstracted from *Foundry. Trade Journal*. See item 14b-79, 1948.

14B-123. Patching the Cupola. N. J. Dunbeck and T. E. Barlow. *American Foundryman*, v. 16, Oct. 1949, p. 48-57.

Development of compressed-air-gun placement process and test results on a number of combinations of ganisters and clays for workability, density, shrinkage, slag resistance, slump resistance, apparent porosity, and temperature effects.

14B-124. Die Fehler im Gussblock und ihre Beziehungen zur Giesstemperatur und Giessgeschwindigkeit. (Defects in Cast Ingots and Their Relation to Temperature and Rate of Casting.) Fritz Beitter. *Stahl und Eisen*, v. 69, Aug. 18, 1949, p. 585-599; discussion, p. 599-600.

Refers only to ferrous ingots. 56 ref.

14C—Nonferrous

14C-77. A Study of Arc-Melted Molybdenum-Rich Chromium-Molybdenum Alloys. H. D. Kessler and M. Hansen. *American Society for Metals*, Preprint No. 33, 1949, 24 pages.

Cr-Mo alloys containing 60-100% Mo were arc melted and cast in an argon atmosphere. The melting method consisted in fusing consumable electrodes made by powder-metallurgical techniques. C and Be were investigated as possible deoxidizers. Measured lattice parameters check the results of other investigators, and the body-centered cubic alloys show complete solid solubility. Oxidation resistance in static air was evaluated at 1200, 1500, and 1800° F. Forgeability and hardness were also studied. 24 ref.

14C-78. Quality Control Review. Tests for Brass, Bronze, and Nickel Alloy Castings. William Romanoff. *American Foundryman*, v. 16, Sept. 1949, p. 40-49.

Various quality control procedures, including temperature control, mechanical testing, fluidity testing, nondestructive testing, sand control, and metallography.

14C-79. Asarco Continuous Cast Shapes—Their Manufacture and Use. J. S. Smart, Jr., and A. A. Smith, Jr. *Iron Age*, v. 164, Sept. 22, 1949, p. 67-72.

Crucible construction, graphite die design, and cooling and casting techniques used with the Asarco process for continuously casting tin bronze alloys. Sizes, tolerances, properties, and shapes (including tubular forms) in which metal can be cast by the process. Varied uses to which such

material has been put. Features which lend the process to production of job-lot quantities.

14C-80. Melting and Casting Zirconium Metal. W. J. Kroll and H. L. Gilbert. *Journal of the Electrochemical Society*, v. 96, Sept. 1949, p. 158-169.

Manner of heating, furnace design, crucible materials, and methods of casting. For the experiments, a high-frequency furnace, an arc furnace, and a split-tube graphite-resistor furnace were used. Preference is given the latter for vacuum fusion while the high-frequency and arc furnaces are well adapted for melting in a noble gas atmosphere Crucible materials, melting in graphite, and casting of ingots. 19 ref.

14C-81. Casting and Machining Zinc Alloy Carburetor Parts. Herbert Chase. *Iron Age*, v. 164, Sept. 29, 1949, p. 66-68.

Production at a high level—averaging up to 500 parts per hr.—through the effective use of handling, casting, trimming, machining, and finishing equipment.

14C-82. More Accurate Castings. L. T. Schakenback. *Metal Progress*, v. 56, Oct. 1949, p. 489-490.

Procedure using mercury pattern for a Cu casting requiring accurate interior surfaces.

14C-83. Eliminate Machining. Leonard G. Daniels. *Metal Progress*, v. 56, Oct. 1949, p. 490-491.

Advantages of single investment castings for a variety of metals to replace complex assemblies. Operations for shuttle lifter and feeder on a weaving machine.

14C-84. Centrifugal Casting of Taurus Bronze. *Machinery*, v. 75, Sept. 15, 1949, p. 385.

Practice of a British firm for casting phosphor bronze gears.

14C-85. New Nonferrous Foundry Is Clean, Light, Well Planned. Robert H. Herrmann. *Foundry*, v. 77, Oct. 1949, p. 82-83, 214-215.

Central Brass & Aluminum Foundry, St. Louis.

14C-86. Effect of Foundry Practice on Properties of Some Binary Copper-Silicon Alloys. A. I. Krynitsky, W. P. Saunders, and H. Stern. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 152-163; discussion, p. 164-165.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-27. See item 14c-32, 1948.

14C-87. Ingot Metal vs. Virgin Metal. Fred L. Wolf. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 576-578; discussion, p. 578-579.

Previously abstracted from *American Foundryman*. See item 14c-37, 1948.

14C-88. Gas Porosity in Nickel-Silver Castings. T. F. Pearson, W. A. Baker, and F. C. Child. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A123-A129; discussion, p. A129-A130.

See abstract from *Metal Industry*, item 14c-42, 1948.

14C-89. The Casting of Marine Bronze Propellers. F. J. Tector and J. Martland. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. B104-B117.

Previously abstracted from *Foundry Trade Journal*, July 22 and July 29, 1948. See item 14d-46, 1948.

14C-90. Safety Devices for Die Casting Dies. H. K. Barton. *Machinery* (London), v. 75, Sept. 29, 1949, p. 458-462.

Methods used to ensure that core withdrawal takes place correctly, and before ejection is attempted.

14D—Light Metals

14D-50. Aluminium-Alloy Castings. A. R. Martin. *Aircraft Production*, v. 11, Sept. 1949, p. 315-319.

Notable examples of high-strength sand casting, gravity die casting, and evacuated die casting.

14D-51. The Bendix Plaster Technique for Aluminum Castings. H. A. Knight. *Iron Age*, v. 164, Sept. 22, 1949, p. 84-87.

Technique for producing nonferrous castings to close tolerances and unusually high as-cast surface smoothness. The process employs calcium sulfate as a core and investment, mixed under vacuum and injected into an inverted mold under pressure.

14D-52. Some Notable Aluminium-Alloy Castings. A. R. Martin. *Foundry Trade Journal*, v. 87, Sept. 8, 1949, p. 297-305.

See abstract of condensed version from *Engineering*, item 14D-37, 1949.

14D-53. Founding of Beryllium. J. H. Jackson, J. G. Kura, M. C. Udy, and L. W. Eastwood. *U. S. Atomic Energy Commission*, AECD-2479, July 13, 1948, 24 pages.

Techniques were developed at Battelle Memorial Institute which permit the production of consistently sound beryllium castings from heats up to 80 lb. Recommendations for melting and casting. Includes diagram of the gas atmosphere induction furnace.

14D-54. Some Notable Aluminium-Alloy Castings. A. R. Martin. *Foundry Trade Journal*, v. 87, Sept. 15, 1949, p. 335-342.

High-strength Al alloys do not possess good casting characteristics. How these difficulties have been overcome, leading to the successful production of castings which are able to withstand heavy, fluctuating loads.

14D-55. Preparation and Casting of Beryllium Melts. J. G. Kura, J. H. Jackson, M. C. Udy, and L. W. Eastwood. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 769-778.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-2479. See item 14D-53, 1949.

14D-56. Grain Size Behavior in Magnesium Casting Alloys. Charles E. Nelson. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 1-23.

Charles Edgar Hoyt annual lecture. The meaning of grain size; the manner in which it is expressed; its importance to serviceability and foundry behavior; the effect of compositional and foundry variables; the most important techniques for grain size control; and the fundamental mechanism of the grain-refining action. Experimental results and conclusions are presented when pertinent to the discussion. 58 ref.

14D-57. Effect of Gating Design on Metal Flow Conditions in the Casting of Magnesium Alloys. H. E. Elliott and J. G. Mezoff. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 223-224; discussion, p. 244-245.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-6. See item 14d-32, 1948.

14D-58. Aluminium Alloy Casting Developments. E. G. West. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A131-A141; discussion, p. A141-A143.

Previously abstracted from *Foundry Trade Journal*. See item 14d-43, 1948.

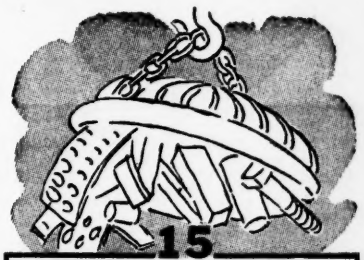
14D-59. Trends in Aluminum Casting Alloys. Walter Bonsack. *American Foundryman*, v. 16, Oct. 1949, p. 39-45.

Official Exchange Paper of AFS to the French Technical Foundry Assoc. discusses the development of Al casting alloys, their properties, heat treatment, and applications in sand, permanent mold, and die casting.

14D-60. Progress Report on Die-Cast Body Parts. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 35, 78.

The recent disclosure of Al die-cast door frames was intended primarily as a progress report on a continuing research project.

For additional annotations indexed in other sections, see: 2B-264-267-268; 3B-209; 16A-91-92-93-94; 16C-14; 23C-65; 23D-141



SCRAP and BYPRODUCT UTILIZATION

15-65. Scrap Charging—Key to Increasing Open Hearth Production. R. R. Fayles. *Blast Furnace and Steel Plant*, v. 37, Sept. 1949, p. 1092-1098.

Factors affecting scrap charging, quality of foreign and home scrap, size of charging box, and scrapyard facilities.

15-66. Cyanide Waste Disposal: Platers Call New Installation "The Model System". Roger Williams, Jr. *Chemical Engineering*, v. 56, Sept. 1949, p. 96-98.

Procedures and equipment used to dispose of cyanide plating wastes. Caustic soda and chlorine are used to convert cyanide to ammonium and potassium carbonates plus NaCl.

15-67. Metal Tube Bases Reclaimed on a Production Basis. R. J. Stanton. *Iron Age*, v. 164, Sept. 29, 1949, p. 70-72.

Reclamation of 3600 usable metal tube bases an hour, with one operation and one high-frequency generator. Ingenious fixturing, plus an extremely short heating cycle, makes profitable the reclaiming of Ni-plated Al and brass tube bases.

15-68. Scrap Metals. Supply and Industrial Applications. H. J. Miller. *Metal Industry*, v. 75, Sept. 16, 1949, p. 223-225; Sept. 23, 1949, p. 251-253.

Difficulties involved in utilizing scrap so that products comply with modern specifications. Supply data are tabulated for Cu, Pb, Zn, and Al-base materials.

15-69. Verarbeitung und Raffination von Leichtmetallschrott. (Processing and Refining Light-Metal Scrap.) Kurt Schneider. *Zeitschrift für Metallkunde*, v. 39, Nov. 1948, p. 342-351; discussion, p. 351.

Methods of removing metallic and nonmetallic impurities from Al. Secondary Al and its alloys are in no way inferior in quality to the primary metal. Laboratory experiments. 31 ref.

15-70. Moderne Methoden zum Einschmelzen und zur Raffination von Leichtmetall. (Modern Methods of Melting and Refining Light-Metal Scrap.) Kurt Schneider. *Metall*, v. 3, Jan. 1949, p. 1-10.

35 references.

15-71. Raffination von Leichtmetallschrott mittels Quecksilber als Scheidemittel. (Refining Light-Metal Scrap With Mercury as Solvent.) Walther Schmidt. *Metall*, v. 3, Jan. 1949, p. 10-13.

The principle of the proposed method is separating the scrap components by dissolving them in Hg, removing the insoluble residue, and then recrystallizing the Al from the

solution. The residual Hg increases, then decreases, the resistance of the Al to corrosion.

15-72. Ausgewählte Betrachtungen aus dem Gebiet der Aluminium-Gewinnung nach dem Quecksilber-Verfahren. (Selected Observations in the Field of Aluminum Production by the Mercury Process.) Georg Messner. *Metall*, v. 3, Jan. 1949, p. 14-15.

Types of Al alloys that can be refined by the Hg process, the differential solubilities of the various constituents, and the effect of refining conditions on the product. It was found that the Hg content of refined Al can be reduced to below 0.00001% and that this process is economical in energy consumption.

For additional annotations indexed in other sections, see:
2B-272; 22B-346

16 FURNACES and HEATING DEVICES

16A—General

16A-89. Heat and Pressure Distribution Inside Industrial Furnaces. J. Henri Brunklaus. *Industrial Gas*, v. 28, Sept. 1949, p. 16-18, 23-26.

Mainly applicable to atmospheric gas burners widely used in Europe.

16A-90. High Frequency Induction Heating. E. May. *Transactions of the Institution of Engineers & Shipbuilders in Scotland*, v. 92, Aug. 1949, p. 488-505; discussion, p. 505-512.

Survey of industrial high-frequency power sources, induction heating, induction melting, induction through-heating for forging, surface hardening by induction, and soldering and brazing with induction heating.

16A-91. The Application of Underfeed Stokers to Foundry Stoves. E. L. Tinley. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 1-10; discussion, 26-32.

Application to core and mold drying. Advantages and other applications.

16A-92. The Application of the Semi-Producer Furnace to Foundry Stoves. A. C. Hutt. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 11-15; discussion, 26-32.

The furnace and its operation for core drying. Labor saving and better temperature control.

16A-93. The Application of the Down-jet Furnace to Foundry Stoves. G. C. H. Sharpe. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 17-25; discussion, 26-32.

Experimental work on the furnace and mold-drying stove.

16A-94. Water Cooled Cupolas. W. H. Bamford. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Aug. 1949, p. 41-48.

Previously abstracted from *Iron Age*. See item 16A-56, 1949.

16A-95. Electric Furnaces in the Metal Industries. G. Reginald Bashforth. *Metallurgia*, v. 40, Sept. 1949, p. 249-254.

Various types of arc furnaces; reference is made to the electric reduction furnace.

16A-96. Heat Transfer to Liquid Metals Flowing in Asymmetrically Heated Channels. W. B. Harrison and J. R. Menke. *Transactions of the American Society of Mechanical Engineers*, v. 71, Oct. 1949, p. 797-802; discussion, p. 802-803.

Previously abstracted from *American Society of Mechanical Engineers*, Paper No. 48-A-51, 1948. See item 16A-27, 1949.

16A-97. Controlled Atmospheres for Metals. L. F. Spencer. *Materials & Methods*, v. 30, Oct. 1949, p. 83-92.

One of a series of comprehensive articles on engineering materials and their processing. 14 ref.

16A-98. Improved RF Induction Heating Cuts Processing Costs. Herman C. Dustman. *Steel*, v. 125, Oct. 17, 1949, p. 72-75.

Significant advancements in equipment design, resulting in more effective use of high-frequency induction heating on such jobs as through heating for forging, annealing for forming and drawing operations, and selective hardening.

16A-99. Die Grundlagen der Anwendung der Elektrowärme in der metallverarbeitenden Industrie. (The Principles of the Application of Electric Heat in the Metal-Working Industry.) Fr. Knoops. *Metall*, v. 3, Mar. 1949, p. 76-80.

16B—Ferrous

16B-89. The Application of Electric Heat to Iron Production, Processing, and Refining. G. W. Keller. *Brown Boveri Review*, v. 36, May-June 1949, p. 191-201.

16B-90. Mary Blast Furnace; Last of Hand-Filled Stacks in America. John D. Knox. *Steel*, v. 125, Oct. 10, 1949, p. 136, 138, 140, 142, 144.

Furnace of the Sharon Steel Corp., Lowellville, Ohio.

16B-91. Open Hearth Maintenance. C. W. Conn. *Iron and Steel Engineer*, v. 26, Sept. 1949, p. 74-75; discussion, p. 75-76.

Practices used by the Ford Motor Co.

16B-92. Maintaining Hearths in Heating Furnaces and Soaking Pits. Charles N. Jewart. *Iron and Steel Engineer*, v. 26, Sept. 1949, p. 116-119; discussion, p. 119-121.

Maintenance of batch-type regenerative furnaces and single, double, and triple-fired continuous furnaces with recuperators.

16B-93. Construction and Operation of an Oil-Fired Malleable Iron Holding Furnace. F. Coghlin, Jr. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 518-525; discussion, p. 525-527.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-18. See item 16b-41, 1948.

16B-94. Pipe Processing With Gas. Charles F. Dabney. *Industrial Gas*, v. 28, Oct. 1949, p. 5-6, 28.

Equipment and procedures for bending, stress relieving, annealing, and cutting pipe, using gas as heating fuel.

16B-95. Largest Carburizing Plant Is Completely Automatic. Arthur Q. Smith. *Industrial Gas*, v. 28, Oct. 1949, p. 9-10, 28.

16B-96. Latest Developments in Heating and Heat Treating. H. M. Heyn. *Industrial Gas*, v. 28, Oct. 1949, p. 11-13, 26.

Some of the latest equipment developed by Surface Combustion Corp.

16B-97. The Use of Gradiation Heat in Seamless Tube Production. Gerald Eldridge Stedman. *Machine and Tool Blue Book*, v. 45, Oct. 1949, p. 115-116, 118-120, 122, 124, 126.

Application of process to annealing, tempering, normalizing, and heating for forming and forging in production of seamless tubes.

16B-98. Ferrous Melting Furnaces in the United States and Canada. A. W. Gregg. *American Foundryman*, v. 16, Oct. 1949, p. 27-32.

A condensed version of the Official Exchange Paper from AFS to International Foundry Congress.

16C—Nonferrous

16C-13. Die Abhitzeverwertung bei den Unterharzer Metallhütten. (The Utilization of Waste Heat in the Unterharzer Smelters.) Wilhelm Westphal. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 1, Oct. 1948, p. 193-204.

Equipment used for the above in several different places in these plants, which include various types of smelters for production of Zn, Cu, and Pb.

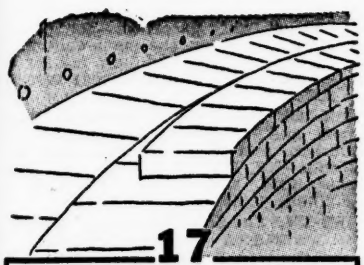
16C-14. Nonferrous Melting With Induction Lift Coil Furnaces. W. J. Doelker. *Foundry*, v. 77, Oct. 1949, p. 76-77, 116, 119, 122.

Furnaces and procedures used by National Cash Register Co. to produce various castings from copper-base alloys.

16C-15. Protective Atmospheres for Annealing Non-Ferrous Wire. E. G. de Coriolis and O. E. Cullen. *Wire and Wire Products*, v. 24, Oct. 1949, p. 859-864, 976-981.

Equipment and procedures.

For additional annotations indexed in other sections, see: 2B-263; 19B-196-202



17 REFRACTORIES and FURNACE MATERIALS

17-88. Refractories. Their Selection and Specification. B. L. Majumder and M. A. Ghain. *Refractories Journal*, Aug. 1949, p. 265-267, 269-273.

Discussed from the standpoint of properties.

17-89. Laboratory, Now in Service, Combines Testing of Refractories With Research. Charles Longenecker. *Blast Furnace and Steel Plant*, v. 37, Sept. 1949, p. 1078-1080.

New laboratory of the General Refractories Co.

17-90. Basic Brick in the Open Hearth Furnace: II. (Concluded.) Vernon W. Jones. *Industrial Heating*, v. 16, Sept. 1949, p. 1626, 1628, 1630.

Suspended construction, removal of deposits in slag pockets without the use of dynamite, gains made in the use of basic brick above the hearth, and possible future applications.

17-91. The Properties and Uses of Pyrometric Cones—Orton Standard Pyrometric Cones. *Edward Orton, Jr., Ceramic Foundation* (Columbus, Ohio). Apr. 1949. 55 pages.

The Orton cone series, temperature, equivalents, and use.

17-92. Testing Refractories for the Foundry. S. M. Swain. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 208-221; discussion, p. 221-222.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-26. See item 17-37, 1948.

17-93. Refractories Used in Steel and Iron Foundries. W. H. Owen. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 342-344; discussion, p. 344.

A general discussion of types and applications.

17-94. Refractory Materials in the Foundry Industry. G. R. Rigby and A. T. Green. *Proceedings of the Institute of British Foundrymen*, v. 41, 1947-1948, p. A144-A150; discussion, p. A150-A151.

Previously abstracted from *Foundry Trade Journal*. See item 17-84, 1948.

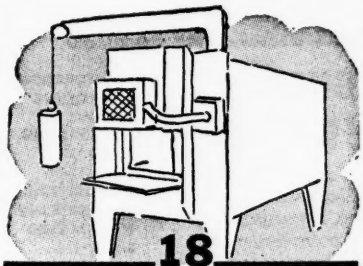
17-95. Strahlung Feuerfester Stoffe. (Radiation of Refractory Materials.) C. A. Landfermann. *Chemie-Ingenieur-Technik*, v. 21, Aug. 1949, p. 295-297.

Uses recent research data to indicate quantitatively the frequency dependence of the radiation of refractory materials; in the short wavelength range, radiation can be materially increased by the addition of metallic oxides. 11 ref.

17-96. Modern Refractories Give New Operating Economies. R. P. Heuer and M. A. Fay. *Iron Age*, v. 164, Oct. 6, 1949, p. 82-85; Oct. 13, 1949, p. 86-90.

The suitability of silica, sillimanite, basic, and carbon refractories for various blast-furnace uses appraised from the standpoint of cost considerations and metallurgical characteristics in the first installment. In the concluding part, developments in refractories for openhearth furnaces and mixers, soaking pits, and forging furnaces, and economies relating to the all-basic furnace. Also includes a listing of basic-end openhearth installations in the U. S. and Canada.

For additional annotations indexed in other sections, see: 2B-263; 5A-51



18 HEAT TREATMENT

18A—General

18A-31. Hardening, Brazing Simplified by Induction Heating Method. *Western Metals*, v. 7, Sept. 1949, p. 37-38.

Principle is radically different from conventional practices. High-frequency electric current is generated in a converter and transmitted to the work through water-cooled coil-copper tubing with one or more turns. The "shorted turn" principle sets up a heating resistance.

18B—Ferrous

18B-166. An Engineering Analysis of the Problem of Quench Cracking in Steel. J. W. Spretnak and Cyril Wells. *American Society for Metals*, Preprint No. 14, 1949, 36 pages.

As a result of a statistical analysis of thousands of quench-cracking data obtained in commercial practice, effect of quench cracking, of pouring temperature, ingot size, forging reduction, position of steel in ingot, composition, hardenability, uniformity of quenching conditions, temperatures to which cylinders are quenched, and special pre-bore quenching treatments was determined. Among the remedies, that of pre-bore quenching appears to be one of the most effective. 13 ref.

18B-167. Pre-Bore Quench for Hollow Cylinders. J. W. Spretnak and C. C. Busby. *American Society for Metals*, Preprint No. 15, 1949, 12 pages.

The effect of pre-bore quenching on the minimum depth of notch required to cause cracking of standard specimens, 6.5 in. o.d., 2.75 in. i.d., and 0.5 in. thick. Pre-bore quenching involves a water quench of the bore for a certain period of time, prior to the simultaneous quenching of both bore and outer surfaces of hollow cylinders.

18B-168. The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels. Joseph F. Libsch, Wen-Pin Chuang, and William J. Murphy. *American Society for Metals*, Preprint No. 21, 1949, 27 pages.

Alloying elements are classified into two fundamental groups: carbide-formers and ferrite-strengtheners; the influence of each group. Isothermal transformation diagrams for AISI 4340 and 1050 steels austenitized by induction heating. Data from end-quenched specimens were used to study the degree of alloy solution in the austenite. For proper selection of alloy steels to be used in induction hardening, the austenitizing cycle and the nature of the alloying elements must be considered. 15 ref.

18B-169. Isothermal Temper Embrittlement. Leonard D. Jaffe and Donald C. Buffum. *American Society for Metals*, Preprint No. 23, 1949, 12 pages.

A TTT diagram was determined for an SAE 3140 steel. Temperature of transition from ductile to brittle failure in the Charpy test was used as a measure of extent of transformation. 13 ref.

18B-170. Dry Cyaniding Reduces Costs on Variety of Steel Parts. F. R. Nethaway. *Materials & Methods*, v. 30, Sept. 1949, p. 61-63.

In addition to handling batch production at low cost, Oldsmobile set-up permits close control over case concentration and depth, and holds distortion to a minimum.

18B-171. Strain Aging in Welding Structural Steel. Part II. W. H. Bruckner and S. W. Sandberg. *Welding Journal*, v. 28, Sept. 1949, p. 397s-404s.

Sensitivity of strain-aged specimens of base and weld metal and effects of thermal (stress relief) treatment on structure and properties.

18B-172. Large-Scale Production Carburizing. *Steel*, v. 125, Sept. 26, 1949, p. 64-65.

Results of standardized heat treating procedures on automotive parts.

18B-173. The Basic Principles of Carburizing. IV. E. Barber. *British Steelmaker*, v. 15, Aug. 1949, p. 390-393.

Further causes of unsatisfactory carburizing. The correct practice in the carburizing of a specific example

—a spline shaft. Methods of local carburizing. (To be concluded.)

18B-174. The Basic Principles of Carburizing. V. (Concluded.) E. Barber. *British Steelmaker*, v. 15, Sept. 1949, p. 444-447.

Cyaniding and its applications and equipment.

18B-175. Thermal Treatment; German Forgings, Castings, and Armour Plate. *Iron and Steel*, v. 22, Sept. 1949, p. 437-439. Condensed from Section VI, BIOS Overall Report No. 15, H. M. Stationery Office, London. (To be concluded.)

18B-176. Strain-Age-Hardening. (Concluded.) C. A. Edwards. *Iron and Steel*, v. 22, Sept. 1949, p. 439-440.

Conclusions reached in the course of this review with special reference to the effect of some elements.

18B-177. Carburizing - Martempering Procedure Streamlines Crankshaft Heat Treating. Joseph J. Ebner. *Steel*, v. 125, Oct. 3, 1949, p. 72-74, 94.

Combination heat treating setup at Evinrude Motors, which uses salt in four baths. Besides substantially decreasing distortion of drop-forged shafts, this one-operator supervised method provides close control and uniform carburization of all surfaces with assured penetration.

18B-178. Les recherches sur la trempe isotherme en France et à l'Étranger. (Research on Isothermal Quenching in France and in Foreign Countries.) G. Delbart and M. Ravery. *Revue de Métallurgie*, v. 46, June 1949, p. 399-418.

Comprehensive survey. Methods for study of isothermal transformation, influence of alloying elements on shape of the "S" curve, and the pearlitic or Ar' transformation. (To be continued.)

18B-179. A Horizontal Scanner for Industrial R-F (Radio-Frequency) Hardening. *Industrial Heating*, v. 16, Sept. 1949, p. 1558, 1560, 1562, 1564, 1640, 1642.

Scanner developed by Westinghouse Electric Corp. for hardening shafts and pins.

18B-180. Furnace Management. Trebor B. Morris. *Metal Progress*, v. 56, Oct. 1949, p. 501-503.

Continuous furnace for heat treatment which is also used as a gas carburizer.

18B-181. Annealing for Machinability. Kenneth Midlam. *Metal Progress*, v. 56, Oct. 1949, p. 504-505.

Isothermal treatment of X4340 which increases furnace capacity 56% at the American Locomotive Co., Railway Steel-Spring Div.

18B-182. Flame Hardening. A. E. Anderson and R. H. Lundquist. *Metal Progress*, v. 56, Oct. 1949, p. 506-508.

Machine used for flame hardening tractor gears.

18B-183. Heat Treating Parts at Packard. Fred W. Vogel. *Modern Machine Shop*, v. 22, Oct. 1949, p. 98-104, 106.

Methods and equipment.

18B-184. Multi-purpose Induction Hardening Units. *Machinery* (London), v. 75, Sept. 22, 1949, p. 413-415.

Heat treatment of parts of portable electric tools with an induction heating unit.

18B-185. Gas Carburizing. A Review of Equipment Developed by Birlec Ltd. *Automobile Engineer*, v. 39, Sept. 1949, p. 345-349.

18B-186. Delayed Quench for Steel Castings. S. L. Gertsman. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 91-99; discussion, p. 99.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-2. See item 18b-60, 1948.

18B-187. Effect of Manganese-Sulphur Ratio on the Rate of Anneal of Black-Heart Malleable Iron. J. E. Rehder. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 138-145; discussion, p. 145-151.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-30. See item 18b-61, 1948.

18B-188. Stress Relief of Gray Cast Iron. J. H. Schaum. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 265-277; discussion, p. 277-278.

Results of a number of experiments. One set of experiments consisted of making relaxation tests and using the rate of relaxation as a means of evaluating stress relief. Observations of heat treatments on highly stressed cast wheels. 15 ref.

18B-189. Some Principles Involved in Heat Treatment of Gray Cast Iron. Alfred Boyles. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 462-472; discussion, p. 472.

See abstract from *American Foundryman*, item 18b-76, 1948.

18B-190. Gray Iron Hardenability and Its Relation to Air Quenching of Castings. R. A. Flinn and R. J. Ely. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 508-515; discussion, p. 515-517.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-35. See item 18b-62, 1948.

18B-191. Conventional vs. Salt Bath Hardening of Cast Iron Cylinder Liners. G. M. Lahr. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 536-541; discussion, p. 541-542.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-42. See item 18b-63, 1948.

18B-192. Eigenschaften von aufgekohlten Sinterstahlkörpern. (Properties of Carburized Sintered Steel Bodies.) Gerhard Will. *Stahl und Eisen*, v. 69, Sept. 1, 1949, p. 630-634; discussion, p. 634-635.

To increase their strength properties, sintered iron parts were carburized with illuminating gas, H_2-CO mixtures, and by addition of powdered cast iron or graphite. Carburization with gases was found unsatisfactory; but the parts that were carburized by use of iron powder or graphite had relatively high tensile-strengths.

18B-193. Relationship Between Hardness and Tempering Temperature: Carbon and Alloy Steels, Including Series 1000, 1300, 3100, 3200, 4100, 2300, 4600, 5100, and 6100. *Materials & Methods*, v. 30, Oct. 1949, p. 95.

18B-194. The Stress-Relieving of Welded Structures. R. Weck. *Welding*, v. 17, Oct. 1949, p. 442-452.

Purpose of stress-relieving and its claimed effects. Prefers the term "low-temperature annealing" and indicates its metallurgical importance for certain types of welded structures. Heat treatment for removal of residual stresses is justifiable only if there is definite danger of stress corrosion, or if the material is known to be in a notch brittle condition at the temperature prevailing during fabrication or in service.

18B-195. Better Silicon Irons. T. Waterfall. *Machinery Lloyd* (Continental Edition), v. 21, Oct. 1, 1949, p. 65, 67.

Development. Nitriding results in a large measure of control of crystal growth. Development of optimum controlled-atmosphere heat treating.

18B-196. Precision Hardening High Speed Tool Steels. Norbert K. Koebel. *Iron Age*, v. 164, Oct. 6, 1949, p. 86-90; Oct. 13, 1949, p. 80-85.

First part shows how bright hardening of high speed tools, with complete absence of carburization and decarburization, is possible in the L-shaped furnace, accompanied by significant production cost savings. Construction and operational features of this controlled atmosphere

unit. Concepts concerning theory and application of atmospheres for precision hardening. Metallurgical results, obtained from the quenching phase, compared with air, oil, salt, and lead quench techniques.

18B-197. Buick Uses Localized Heat To Harden Small Parts. H. A. Maloney. *American Machinist*, v. 93, Oct. 20, 1949, p. 71-73.

Equipment and procedures.

18C—Nonferrous

18C-11. Some Effects of Heating Zirconium in Air, Oxygen, and Nitrogen. E. T. Hayes and A. H. Roberson. *Journal of the Electrochemical Society*, v. 96, Sept. 1949, p. 142-151.

Observations were made from 425 to 1300° C. on gain in weight, micro and macrohardness, and metallographic structures. Practical limits for heating and possibilities of producing hard surface coatings. 11 ref.

18C-12. High Strength Nickel Alloy Retains Performance Properties at High Temperatures. C. A. Crawford. *Materials & Methods*, v. 30, Oct. 1949, p. 57-61.

Unusually high strength at ordinary temperatures and at red heat is obtained by suitable heat treatment of Inconel X. Miscellaneous properties and applications.

18D—Light Metals

18D-14. Effects of Quenching Rate and Quench-Aging on the Tensile Properties of Aluminum Alloy 61S. R. C. Lemon and H. Y. Hunsicker. *American Society for Metals*, Preprint No. 34, 1949, 17 pages.

Object was to determine the merits of a heat treating procedure termed quench-aging, compared with conventional quenching and aging. Sections of sheet or plate 0.083-2¼ in. thick were solution heat treated at 970° F. and quench-aged in molten salt at 320, 360, and 400° F. Similar specimens were solution-treated, quenched in various media, and artificially aged at the same temperatures.

18D-15. Simultaneous Aging and Deformation in Metals. J. D. Lubahn. *Journal of Metals* (Technical Section), v. 1, Oct. 1949, p. 702-708.

Constant strain rate tensile tests, constant load creep tests, and variable strain rate tensile tests were carried out on an age hardenable Al alloy.

18D-16. Step Aging of a Magnesium-Base Casting Alloy. E. J. Vargo and G. Sachs. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 567-573; discussion, p. 573.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-3. See item 18d-4, 1948.

For additional annotations indexed in other sections, see:
3B-194-198-201-219-227; 4B-96-99; 6B-163; 14D-59; 16A-97-98; 16B-95-96-97; 16C-15; 19B-201-202; 19D-60; 20B-149-155; 23D-111

19 WORKING

19A—General

19A-223. Fundamentals of the Working of Metals. George Sachs. *Modern Industrial Press*, v. 11, Sept. 1949, p. 6, 8, 44.

19A-224. Labyrinth Seals. *Aircraft Production*, v. 11, Sept. 1949, p. 289-290.

Used in the gas-turbine engine of the British Armstrong Siddeley Mamba for pressure sealing between rotating and fixed members. Forming equipment and procedure for manufacture of the "fins" used in these seals.

19A-225. Speed Table Guides Metal Spinners. Charles F. Benvie. *American Machinist*, v. 93, Sept. 22, 1949, p. 100-101.

Recommended spinning speeds for various thicknesses of Al, Cu, brass, cold rolled, and stainless steel.

19A-226. 58 Pointers for Design of Successful Progressive Dies. J. R. Pacquin. *American Machinist*, v. 93, Sept. 22, 1949, p. 115-117.

19A-227. Wire Die Lubrication. *Wire Industry*, v. 16, Aug. 1949, p. 639.

Types of wet and dry drawing lubricants and aluminum wire lubrication.

19A-228. Sheet Metal Forming Method. *Steel*, v. 125, Sept. 26, 1949, p. 100.

New process known as Marform developed at Glenn L. Martin Co. Advantages include as high as 50% savings.

19A-229. Cold Rolling Technique. V. Resistance of Materials to Deformation. (Continued.) Hugh Ford. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1889-1893; Oct. 1949, p. 2109-2114.

Sept.: Fundamental problems in connection with the resistance offered by cold metal to deformation by rolling. Oct.: Details of measuring yield stress, and curves for typical metals and alloys. (To be continued.)

19A-230. Rolls and Rolling. E. E. Brayshaw. *Blast Furnace and Steel Plant*, v. 37, Sept. 1949, p. 1069-1077, 1086.

The formation of head, web, and flange into rounds. Design diagrams. (To be continued.)

19A-231. The Evolution of Deep Drawing Lubricants for the Porcelain Enameling Industry. G. A. Cairns. *Better Enameling*, v. 20, Sept. 1949, p. 6-7, 26-27.

A general discussion.

19A-232. Progressive Stamping Dies. John F. Tyrrell. *Metal Progress*, v. 56, Oct. 1949, p. 494-496.

Inexpensive, and nonmathematical method of preparing stage dies for the fabrication of the complex shapes found in aircraft components of sheet metal.

19A-233. Economies of Short-Run Stamping Practice. O. T. Andersen and J. M. Andersen. *Iron Age*, v. 164, Oct. 6, 1949, p. 91-94.

Cost savings obtainable in producing limited quantities of stamped parts by the above method. Factors to be considered in application of this technique and comparative cost data.

19A-234. Pre-Spun Metal Shapes Aid Drop Hammer Forming. Gilbert C. Close. *Modern Machine Shop*, v. 22, Oct. 1949, p. 110-112, 114, 116, 118, 120.

Method for spinning flat metal sheets into neutral shapes.

19A-235. Stresses and Strains in Tube-Drawing. H. W. Swift. *Philosophical Magazine*, ser. 7, v. 40, Sept. 1949, p. 883-902.

An attempt is made to examine in some detail the problem of "empty sinking"—drawing without a restrictive mandrel—in order to test the validity of certain simplifying assumptions, to ascertain the probable effects of various impressed conditions, and to compare the results with available experimental data.

19A-236. Establishing Punch Press Die Standards. E. Griffiths. *Tool Engineer*, v. 23, Oct. 1949, p. 19.

Westinghouse project which involves coordination of die design and construction interests throughout more than 20 divisions in widely separated parts of the country.

19A-237. Pre-Finishing Surface Requirements for Formed Metal Products. Edward Engel. *Tool Engineer*, v. 23, Oct. 1949, p. 25-28.

With respect to surface conditions, tool-design defects and operational precautions, lubrication; annealing, normalizing, and pickling. Recommendations.

19A-238. Back Pull Wire Drawing. Dartrey Lewis and Howard J. Godfrey. *Wire and Wire Products*, v. 24, Oct. 1949, p. 873-877, 880-885, 982-983.

A continuous wire-drawing machine with controllable back pull and its performance.

19A-239. Deep-Drawing and Waffle-Forming of Airplane Parts. J. J. Sloan. *Machinery*, v. 56, Oct. 1949, p. 152-158.

Processes employed, equipment required, and factors to be considered in designing parts for deep-drawing and waffle-forming.

19A-240. New Metal-Forming Process Developed. *Aviation Week*, v. 51, Oct. 17, 1949, p. 37.

New process, called Marform, which reduces greatly the cost of producing formed sheet-metal parts. Principal feature is precision control of the pressure curve for the forming cycle. This permits pieces to be formed free of wrinkles and reduces springback to a minimum. It enables an operator to make complex parts, involving drawing, shrinking and stretching, at the rate of 50-120 per hr., yet hold tolerances to ±0.002 in.

19A-241. Rotary Gang Slitting: An Effective Production Tool. Part III. Eugene L. Mackey. *Steel*, v. 125, Oct. 17, 1949, p. 77-80, 84.

Importance of distinguishing between tonnage production requirements of a given plant and capacities of slitting equipment, how to avoid excessive wear and obtain best results in slitting, and what design features are desirable in slitting-line units.

19A-242. Positive Knockouts for Dies. J. R. Paquin. *American Machinist*, v. 93, Oct. 20, 1949, p. 80-83.

Various designs for positive part ejection under various circumstances.

19A-243. Verfahren zur Ermittlung der Eignung von Ziehfetten. (Process of Determining the Suitability of Drawing Oils.) F. Eisenkolb. *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 287-288.

Experiments made to determine the effectiveness of three different oils and oily mixtures as lubricants for the deep-drawing of sheet metals.

19A-244. Die Gestaltung der Pressmatrizen von Metallstrangpressen. (The

Shaping of Dies for Metal Extrusion Presses.) F. Hemmerich and N. Arenz. *Metall*, v. 3, Feb. 1949, p. 37-40.

In extrusion of nonsymmetrical bars and rods, flow rate of the metal decreases from the center of the die towards its periphery. Hence, the bars are imperfect in shape and nonuniform in density. A method of correcting this difficulty.

19B—Ferrous

19B-184. Dual Die Setup Completes Steel Cabinet Body at Each Press Stroke. Herbert Chase and C. M. Lumley. *Steel*, v. 125, Sept. 19, 1949, p. 76-77, 108, 111.

19B-185. Exacting, Ingenious Presswork Goes Into Manufacture of Modern Truck Tank. P. D. Aird. *Modern Industrial Press*, v. 11, Sept. 1949, p. 13-14, 46, 48.

Manufacture at Brown Steel Tank Co., Minneapolis; includes welding.

19B-186. Highlights of Steel Fabricating at Johnstown-Lorain Works of Carnegie-Illinois Steel Corporation. Walter Rudolph. *Modern Industrial Press*, v. 11, Sept. 1949, p. 22, 26, 28.

Miscellaneous press equipment.

19B-187. Presses Contribute to Steady Growth of Heating Assurance Corp. Howard E. Jackson. *Modern Industrial Press*, v. 11, Sept. 1949, p. 38, 40, 42.

Production of heating and ventilating equipment; includes spot welding.

19B-188. Impact Extrusion of Hexagon Steel Bolts. *Machinery* (London), v. 75, Sept. 8, 1949, p. 347.

Development of Swiss firm.

19B-189. 120-Million-Pound Push. James Blane. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 100, 110.

High-pressure presses. Compares those of the western world with the much larger German ones.

19B-190. Drawing Die Lubricant. J. C. Heymann. *Metal Progress*, v. 56, Oct. 1949, p. 497-498.

An efficient phosphating compound used preparatory to cold drawing of steel tubing.

19B-191. Impact Stamping Cuts Cost in Forming Metallic Sheet and Plate. Thomas A. Dickinson. *Western Metals*, v. 7, Sept. 1949, p. 19-22.

"Impact stamping" is an unprecedented, efficient, and inexpensive method of forming metallic sheet and plate materials with rope-type drop hammer equipment. Principles of process.

19B-192. Western Tool Company Combines Special Techniques. *Western Metals*, v. 7, Sept. 1949, p. 24-25.

Use of punch presses for hot-forging operations. Tools are made from SAE 4140 steel.

19B-193. Stepping Up Production With Hydraulic Metalworking Presses. Frank M. Scotten. *Production Engineering & Management*, v. 24, Oct. 1949, p. 51-54.

Procedures used at Nineteen Hundred Corp., St. Joseph, Mich.

19B-194. Modern Forging Techniques for Mass Produced Components. *Production Engineering & Management*, v. 24, Oct. 1949, p. 55-62.

Procedures and equipment used by the Chevrolet Forge Division for forging 1250 tons of steel per average working day.

19B-195. The Manufacture of Domestic Refrigerators. *Machinery* (London), v. 75, Sept. 22, 1949, p. 403-411.

Assembly of compressors and production of cabinets at British steel firm using pressing operations.

19B-196. Verfahren zur Erleichterung des Ziehvorganges hochlegierter Stähle. (Method of Facilitating the Drawing of High-Alloy Steels.) **F. Rossteutscher.** *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 282-283.

A patented method for treating high-alloy steels with oxalic acid solution mixed with soluble sulfides or H_2S. 10 ref.

19B-197. Streckung und Wanddickenänderung beim Walzen von nahtlosen Stahlrohren auf dem Reduzierwalzwerk. (Elongation and Change in Wall Thickness in the Rolling of Seamless Tubes on the Reducing Rolling Mill.) Walter Boettcher and Anton Pomp. *Stahl und Eisen*, v. 69, Sept. 1, 1949, p. 615-624; discussion, p. 624-626.

Factors that affect the above, in particular, the effect of structural design of the rolling mill, of initial dimensions of the bloom, and of method of rolling. 13 ref.

19B-198. Die Formänderung von Rohren im Einzelkaliber des Reduzierwalzwerks. (Change of Shape of Tubes in a Single Pass of a Reducing Rolling Mill.) Rudolf Hartjenstein. *Stahl und Eisen*, v. 69, Sept. 1, 1949, p. 626-630.

Effects of groove design, rolling temperature, and wall thickness of tube on the reducing and elongating action of the mill and on the condition of the finished tubes.

19B-199. Palstic Strain and Hysteresis in Drawn Steel Wire. R. S. Brown. *Wire and Wire Products*, v. 24, Oct. 1949, p. 891, 894-899, 902-907, 992.

Previously abstracted from *Journal of the Iron and Steel Institute*. See item 19B-117, 1949.

19B-200. Magnet Wire Plant—Fort Wayne Works, General Electric Co. F. A. Arnold. *Wire and Wire Products*, v. 24, Oct. 1949, p. 908-911, 914-915.

Processes and production methods used in manufacture of magnet wire.

19B-201. Processing of Stainless Steel Wire. Stanley P. Watkins. *Wire and Wire Products*, v. 24, Oct. 1949, p. 916-917, 920-923, 968-972.

Some recent advances including rolling, drawing, annealing, pickling, and electropolishing.

19B-202. Reclaiming Railroad Rail Joints. Will C. Grant. *Industrial Gas*, v. 28, Oct. 1949, p. 7-8, 24-26.

Rail joints are special steel plates which join the rails. Five plants in the U.S. are engaged in reclaiming worn joints by a reforming process. Forging and heat treatment procedures and equipment.

19B-203. Hobbing Mold Cavities in Alloy Steels. John Sekowski. *Machinery*, v. 56, Oct. 1949, p. 150-151.

19B-204. Stamping Expedites Steel Burial Casket Output. W. E. Barrott, Jr. *Iron Age*, v. 164, Oct. 13, 1949, p. 69-73.

The number and speed of operations normally required have been reduced by use of a hydraulic press with dies that rapidly draw, form, trim, and pierce components of the above. A welded assembly has proved much stronger than the previous method of soldering.

19B-205. New Method Simplifies Drawing of Front Fenders. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 36-37.

"Revolutionary" technique developed by Pontiac Motor Div. The basic feature is preliminary formation of the nose section in the blank before the blank is presented to the drawing die. Formation of the nose is accomplished in a special machine, incorporating a seam welder. At the completion of nosing, the seam welding roll is guided upward by a track while welding the joint. Contrary to conventional practice, only a single drawing operation is then required to produce the fender.

19B-206. Standardizing Cuts Die Costs. Ernest C. Noreen. *American Machinist*, v. 93, Oct. 20, 1949, p. 104-105.

Three segmental dies, with interchangeable punch and die blocks and spacers fastened in master holders, can form, cut off, and pierce all required sizes of chain side links.

19B-207. New Criteria for Predicting the Press Performance of Deep Drawing Sheets. W. T. Lankford, S. C. Snyder, and J. A. Baucher. *American Society for Metals*, Preprint No. 30, 1949, 31 pages.

Evidence refuting the belief that an isotropic material is more suitable for all types of sheet metal forming operations than an anisotropic material. For certain unsymmetrical formations, material having a considerable degree of plastic anisotropy of a favorable nature results in the best press performance. Work was confined to Al-killed deep drawing sheet steel. 15 ref.

19C—Nonferrous

19C-24. Small Tubes. Charles T. Flachbarth and Chester S. Pondo. *Metal Progress*, v. 56, Oct. 1949, p. 499-500.

Case history of the application of improved metallurgical engineering methods, processes, tooling and material utilization to achieve production economy and an improved product in the cold drawing of seamless brass tubing.

19C-25. Selection Chart for Deep-Drawing Dies. *American Machinist*, v. 93, Oct. 20, 1949, p. 121, 123.

Use of chart by which the die designer can lay out a series of drawing dies so the appropriate reduction in area per draw is achieved for material involved, type of operation, and required properties of the shell. It is applicable to 66-34, 70-30, 85-15, and 80-20 brasses, and to silicon bronze.

19D—Light Metals

19D-57. Dies for Home Freezer-Lid Panels. Edward N. Sorensen. *Tool Engineer*, v. 23, Sept. 1949, p. 26-27.

Production sequence using 20-gage cold rolled, deep draw stock. Operations are: shear stock to size; draw; trim and pierce; redraw and restrike; cam pierce nine holes; and cam flange.

19D-58. The Production of Light Alloy Forgings and Stampings. *Machinery*, v. 75, Sept. 15, 1949, p. 367-372.

Methods employed by British firm.

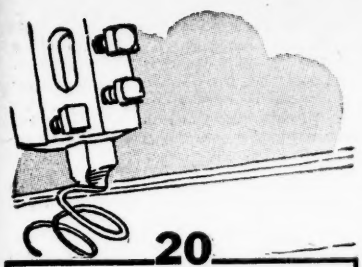
19D-59. Cold Rolling. Developments in Modern Mill Design. L. R. Underwood. *Metal Industry*, v. 75, Sept. 16, 1949, p. 231-233; Sept. 23, 1949, p. 243-245, 249; Sept. 30, 1949, p. 270-273.

Mills used in the light-alloy industry. Design of electrical strip-tensioning equipment. Final installment gives special attention to the Sendzimir mill, the "Y" mill, and the Steckel mill.

19D-60. Forging Aluminum and Magnesium. G. D. Welty. *Machinery*, v. 56, Oct. 1949, p. 143-149.

Equipment, procedures, and typical applications. Heat treatment, cleaning, and inspection.

For additional annotations indexed in other sections, see: 7B-200; 11-320; 13-61; 16A-98; 16B-97; 21B-69



20

MACHINING and MACHINABILITY

20A—General

20A-405. Home-Ground Step Drills Replace Subland Type. *Iron Age*, v. 164, Sept. 22, 1949, p. 88.

Substantial savings in tool cost are being made by Oldsmobile by substituting two-flute step drills with special grinding done in their own toolroom for four-flute subland drills.

20A-406. Shop Shots From Sangamo. *American Machinist*, v. 93, Sept. 22, 1949, p. 96-97.

Several machine-shop operations at Sangamo Electric Co.

20A-407. Special Tooling Makes Precision Racks and Pinions. H. J. Williams. *American Machinist*, v. 93, Sept. 22, 1949, p. 98-99.

20A-408. Math Cuts Cost of Machining Studies. M. Kronenberg. *American Machinist*, v. 93, Sept. 22, 1949, p. 104-106.

Dimensional analysis often permits substantial reductions in the cost of metal-cutting investigations. Through this technique, reliable information can be obtained from incomplete sets of experiments, thereby saving an appreciable part of the expense of collecting complete experimental data.

20A-409. Practical Ideas. *American Machinist*, v. 93, Sept. 22, 1949, p. 125-130.

Consists of the following: light, decorative work turned in ellipse-generating chuck (Michael P. Blake); adjustable angle plate guides dresser-holds setup (Al Lemprecht); parallel bar checks irregularities in long, flat surface (David T. Lyons, Sr.); slideways for drill vises abolish clamping time (Allan Clark); ball bearing and bearing ball support tailstock pipe center (Tyler G. Hicks); lathe toolholder prevents toolbit breakage (J. Martin); layout and scoring method matches cams with pistons (W. A. Hahn); collet closer handles rough dividing-head mill work (Lew Suverkrop); threaded adapter holds screws for special machining (George F. Burnley); cast iron as a die material (J. H. Sperman); touch-and-gap technique gages unusual parts (Robert Mery); how to cut metric threads (J. Martin); single-point threading tool taps large or odd profiles (John Settle); automatic drill release clears drillpress spindle (F. E. Riley); and other miscellaneous shop hints.

20A-410. Chart for Estimating Cutting Time. *American Machinist*, v. 93, Sept. 22, 1949, p. 143.

Permits quick estimates of time required for turning and boring work.

20A-411. Selection and Working of Metals Prior to Finishing Operations. Edward Engel. *Tool Engineer*, v. 23, Sept. 1949, p. 28-30, 34.

Recommendations applicable to all phases of machine-shop procedures including selection of metals, cutting tools, and fluids, relative merits of grinding and machining, etc.

20A-412. Permanent Tooling for Short Setup Multiple Drilling. J. I. Karash. *Tool Engineer*, v. 23, Sept. 1949, p. 31-32.

Typical examples. Factors to be considered before adoption.

20A-413. Crush Dressing of Grinding Wheels. D. H. Currie. *Tool Engineer*, v. 23, Sept. 1949, p. 33-34.

20A-414. The Milling Process. Mario Martelloti. *Tool Engineer*, v. 23, Sept. 1949, p. 35-39.

Details of calculations.

20A-415. Gadgets. *Tool Engineer*, v. 23, Sept. 1949, p. 55-56.

"Drill Fixture for Odd-Contour Handle", Ingvar Okerfors; "Attachment for Drilling Angular Holes", H. Moore; "Mandrel for Threaded Parts", Geo. W. Brown; and other miscellaneous shop hints.

20A-416. Rotary Gang Slitting. Eugene L. Mackey. *Steel*, v. 125, Sept. 26, 1949, p. 66-70, 88, 90; Oct. 3, 1949, p. 75-78, 80.

Relative advantages of drive and pull-type slitting lines and factors in selection and operation, ratio of slitting time to total cycle time, advantages and disadvantages of large coils, high speed, and coil cars. Time studies were made on a wide range of coil sizes. Techniques used to slit flat sheets, scrap disposal methods, and equipment required to slit narrow strands. (To be concluded.)

20A-417. Electronic Control. S. A. Ghalib. *Aircraft Production*, v. 11, Sept. 1949, p. 303-305.

Machine-tool applications for control of speed, feed, and profile machining.

20A-418. Templates for Rapidesign. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 104-106.

Design and fabrication of precision templates used in drafting rooms.

20A-419. Shop Problems. H. Sanders. *Machinery Lloyd* (Overseas Edition), v. 21, Aug. 27, 1949, p. 83-85.

Series of problems and their solutions: boring tapered holes; grinding cutting tools; making form tools; choice of wheels; dressing the wheel; finning tools; reaming problems; and the square-hole drill.

20A-420. Design Trends and the Style of Machine Tools. Lathes. Part II. Tibor Haas. *Engineers' Digest*, v. 10, Aug. 1949, p. 284-288, 299.

20A-421. Strain Gage Dynamometer for Measuring Cutting Tool Loads. H. Rottersman, A. J. Bettinger, and W. P. Blake. *Iron Age*, v. 164, Sept. 29, 1949, p. 55-61.

During research into hot machining potentialities, the need arose for a cutting-tool load-measuring device. The instrument developed is simple to operate, accurate, able to measure instantaneous loads, inexpensive to construct, and caused no interference with machining operations. Construction, calibration, and use.

20A-422. Machining Sintered Powdered-Metal Bearing Materials. E. J. Weller. *Machinery* (London), v. 75, Sept. 8, 1949, p. 341-343.

Recommended procedures and tool designs.

20A-423. Form Turning and Boring With a Dial Indicator Attachment. A. Maier. *Machinery* (London), v. 75, Sept. 8, 1949, p. 343-344.

Setup for machining the cavity of a die-casting die for wheel hubs, a typical example of the above.

20A-424. Crossed Axis Shaving of Gears. H. Pearson. *Machinery* (London), v. 75, Sept. 8, 1949, p. 350-352.

20A-425. Talented Tooling. *American Machinist*, v. 93, Oct. 6, 1949, p. 122-123.

Includes short items entitled: Toolmaker's buttons control drill jigs; Impellers produced by double-grinding; Automatic recessing tool grooves forged links; Motorcycle cylinders honed at high speed; and Flute-to-center check measures taps.

20A-426. Universal Dies for Short-Run Jobs. Federico Strasser. *American Machinist*, v. 93, Oct. 6, 1949, p. 127.

Advantages and limitations.

20A-427. Practical Ideas. *American Machinist*, v. 93, Oct. 6, 1949, p. 132-136.

Includes short items entitled: Large power tapping machine made from cast-off parts (Dan Penway); Revised drilling method eliminates slow layout work (Clement F. Brown); Spot weld tacking simplifies assembly fixtures (H. Shum); Scissor extractor lifts ball bearings (R. B. Wolverhampton); Swinging needle indicates lathe-center tightness (H. Moore); Shop slotter constructed from welded frame and shaper (Lowell F. Stull); Lathe takes over mill job to balance machine load (Lyle C. Vinger); Indicator gage checks grooves (H. G. Frommer); and other miscellaneous shop hints.

20A-428. An Analysis of Blanking Die Designs, Part VII. C. W. Hinman. *Modern Machine Shop*, v. 22, Oct. 1949, p. 152-154, 156, 158, 160.

Special blanking and cutting dies, universal notching dies, the cutting of double rows of alternate blanks, and multiple perforating and blanking.

20A-429. Rear-Facing Attachment for Lathes. Albert Maier. *Machinery* (London), v. 75, Sept. 29, 1949, p. 447-448.

20A-430. Economies in Grinding Obtained by Automatic Sizing Devices. J. C. Zelenka. *Machinery* (London), v. 75, Sept. 29, 1949, p. 449-450.

20A-431. What Economies Can You Expect From the Use of Solid Carbide Insert Cutting Tools? William F. Scheicher. *Machine and Tool Blue Book*, v. 45, Oct. 1949, p. 85-88, 90, 92-96.

Case histories, photos, and drawings.

20A-432. Turret Lathe Practice. E. L. Murray. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 26-30.

Use of machining-rate tables, factors determining ultimate h.p. demand on machine motors, correlation of 1st and 2nd chuckings, planning bar-stock jobs, and toggle-bolt second-operation tooling.

20A-433. Economical Production of Short Run Jobs. William Orebaugh. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 45-50.

Complete detail set-ups for economical screw-machine production of motor pulleys, adjusting nuts, and socket holders.

20A-434. Magazine Automatic Pneumatic Bar Feed. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 53-56.

Unit cuts down unproductive time.

20A-435. Milling Fixture Design and Use. Mario Martellotti. *Tool Engineer*, v. 23, Oct. 1949, p. 34-37.

20A-436. Reversible Low Production Tool for Irregular Casting. C. F. Brown. *Tool Engineer*, v. 23, Oct. 1949, p. 40.

20A-437. Turbine-Blade Production. *Aircraft Production*, v. 11, Oct. 1949, p. 323-330.

Methods and equipment. Several ingenious adaptations of standard types of machine-tools. Also the tooling can be applied, with minor variations, to a considerable range of blade sizes and forms.

20A-438. Skin Milling. *Aircraft Production*, v. 11, Oct. 1949, p. 340-341.

Planer-type machines for large-area sheets.

20A-439. Profile Cutting. *Aircraft Production*, v. 11, Oct. 1949, p. 342.

Equipment using electronic control from a paper templet.

20A-440. Tool Engineering Ideas. *Machinery*, v. 56, Oct. 1949, p. 193-197.

"Quick-Acting Attachment for Lathe Tailstock", Robert Mawson; "Swivel Mounting With Indicator for Accurate Positioning", F. Server; "Clip-

Forming Die", L. Kasper; "Method of Laying Out Conical Shapes to Specific Dimensions", George Pheil; and "Determining the Approximate Brinell Hardness of Large Parts", Fred B. Money.

20A-441. Improved Method of Size Control for External Grinding. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 46.

20A-442. Simple Fixtures Speed Disk Grinding. R. L. Clark. *American Machinist*, v. 93, Oct. 20, 1949, p. 74-75.

20A-443. Back-Sliding Cutter Mills Tight Corners. Joseph K. Row. *American Machinist*, v. 93, Oct. 20, 1949, p. 78-79.

Special attachments which make possible radical departures from standard milling practice in close quarters.

20A-444. How Do Multiple-Thread Hobs Behave? Part 2. J. P. Breuer. *American Machinist*, v. 93, Oct. 20, 1949, p. 84-86.

Effect of all combinations of major hob elements on gear-tooth form, spacing, and finish.

20A-445. Modern Gear Cutting Equipment. Charles G. Pfeffer. *American Machinist*, v. 93, Oct. 20, 1949, p. 87-98.

Special section deals in detail with principles, types, and capacities.

20A-446. Long Helical Cams Cut on a Gear Shaper. Wm. M. Stocker, Jr. *American Machinist*, v. 93, Oct. 20, 1949, p. 100-101.

20A-447. Practical Ideas. *American Machinist*, v. 93, Oct. 20, 1949, p. 106-110.

Includes the following: spanking punch forces double action in strap-forming die (B. A. Lee); level squares up shaft for interrupted keyway cuts (R. W. Young); bandsaw table attachment allows accurate circular cutting work (Allan B. Nixon); radial drill and portable grinder combined to grind tank vanes (Allan Clarke); circular dovetails cut into valves for brass shock rings; jig plate and box layout approach jig-boring accuracy (Gerrit Vander Lee); eccentric sleeve adjusts boring-bar height (Daniel Love); four work-holders simplify hand operations on small parts (Tyler G. Hicks); and other miscellaneous shop hints.

20A-448. When To Use Standard Carbide Insert Tools and Holders. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 58-59.

Six standard Carboloy insert holders are said to cover a major portion of ordinary production and semi-production work. Standards, together with information on where and when to use each type, described and diagrammed.

20A-449. (Book) **Metal-Cutting Tool Handbook.** 647 pages. 1949. Metal Cutting Tool Institute, 405 Lexington Ave., New York 17, N. Y. $6.50.

Information on various types of metal-cutting tools, their operation and maintenance.

20B—Ferrous

20B-142. Precision Boring a Better Product at Lower Cost. Rupert Le Grand. *American Machinist*, v. 93, Sept. 22, 1949, p. 121.

Important manufacturing and product improvements by precision-boring shaft holes in transmission cases, using a DeVlieg 3-B Jigmil. As compared to previous methods, the time savings range up to 40%. Other advantages.

20B-143. Speeds for Machining Steel With Carbide Dies. *Tool Engineer*, v. 23, Sept. 1949, p. 53. Reprinted from the Carboloy Tool Manual, Carboloy Co.

A nomographic chart.

20B-144. High Performance Milling Tests. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 89.

Test of new Cincinnati No. 5 dual-power plain milling machine. With a ¼-in. depth of cut and a spindle speed of 219 r.p.m., the machine pulled 107 hp. when the feed reached 50 in. per min. No chatter was detectable at this or any other setting.

20B-145. Precision Boring of Transmission Parts. *Iron Age*, v. 164, Sept. 29, 1949, p. 72.

Setup for drilling six holes in SAE 5140 steel forgings used in Buick Dynaflow transmissions.

20B-146. The Production of Domestic Refrigerators. *Machinery* (London), v. 75, Sept. 8, 1949, p. 331-340.

Machine-shop procedures and equipment.

20B-147. Milling Locomotive Piston Valve Liners. *Machinery* (London), v. 75, Sept. 8, 1949, p. 345-346.

Example of use of hydraulic tracer control on standard or semi-standard machines, for profile milling operations which have previously required highly specialized equipment.

20B-148. Grinding Problems. A. S. Rakestraw. *Foundry*, v. 77, Oct. 1949, p. 95, 184, 186, 188, 190, 192.

Questions relating to foundry costs, applicable to the mechanics of grinding, and having to do with application of grinding wheels for specific jobs.

20B-149. Flexible Setup for Producing Cylinder Sleeves. *Automotive Industries*, v. 101, Oct. 1, 1949, p. 34-35.

Machining and heat treating operations at the Sealed Power plant, Rochester, Ind.

20B-150. Special Machine Has Output of 120 Exhaust Manifolds Per Hour. *Automotive Industries*, v. 101, Oct. 1, 1949, p. 45.

Unique five-station machine built for Ford Motor Co., by Ex-Cell-O Corp.

20B-151. Adjustable Drill Table Increases Output. *Production Engineering & Management*, v. 24, Oct. 1949, p. 69.

Use for drilling different types and sizes of holes in various steel plates and housings.

20B-152. Steering Knuckles for Cars Turned and Faced in One Operation. *Machine and Tool Blue Book*, v. 45, Oct. 1949, p. 128-132.

Lathe operation.

20B-153. Determining Cutting Tool Temperatures. Y. C. Lee. *Tool Engineer*, v. 23, Oct. 1949, p. 32-33.

Experimental procedure and results obtained for cast iron, using two types of cutters. Temperatures were determined at 30-sec. intervals.

20B-154. Broaching Connecting Rods. *Iron Age*, v. 164, Oct. 13, 1949, p. 73.

Automotive caps and rods made from separate forgings will match in final assembly by the broaching setup shown. Both side faces of both the rod and cap are straddle broached simultaneously on a 10-ton, 54-in. stroke, dual-ram surface broaching machine.

20B-155. Machining and Martempering 100 Diesel Cylinder Blocks Per Hour. Joseph Geschelin. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 32-34.

Equipment and procedures.

20B-156. Buick Converts to Transfer Line for Water Pump Bodies. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 40-42.

20C—Nonferrous

20C-19. Marking and Index Drilling Operations Complete Part. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 32-35.

Details of tooling operations for diagrammed part, to be made of free-cutting brass on a B. & S. automatic screw machine.

20C-20. Tooling Methods Cut Production Problems. *Screw Machine Engineering*, v. 10, Oct. 1949, p. 36-39, 41.

For complex Zn die-cast part which must be machined to meet exacting concentricity requirements.

20D—Light Metals

20D-19. Machining Aluminum. *Reynolds Metals Technical Advisor*, no. 11, 1949, p. 3-4.

Specific recommendations for lubricants, coolants, and cutting compounds for turning and for various cuts, speeds, and feeds.

20D-20. Tapered Skin-Plating. Weight Economy; Design and Manufacturing Considerations. *Aircraft Production*, v. 11, Sept. 1949, p. 312-314.

Second article on machining of Al alloy wing skins by North American Aviation. Development work, weight economies, cost, machining practice, and design considerations.

20D-21. Pilot Controlled Machines in Aircraft Industries. E. H. Farmer. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 86-88.

Machines for fabricating aluminum parts at Lockheed Aircraft Corp. include Hydro-Tel milling machine, 16 x 20 Lodge & Shipley copymatic lathe, and No. 340-T Giddings and Lewis horizontal boring and milling machine.

20D-22. Production Jig Boring to Close Tolerances. *Machinery* (London), v. 75, Sept. 22, 1949, p. 411-412.

Machining operations for an aluminum alloy supporting arm at the Moore Special Tool Co., Inc.

For additional annotations indexed in other sections, see:
12-195; **14C**-81; **23B**-55

MISCELLANEOUS FABRICATION

21A—General

21A-50. Fuel Cocks; Manufacturing and Testing of the Vickers-Armstrong D and P-Type Units. *Aircraft Production*, v. 11, Sept. 1949, p. 307-311.

Design details, machine-shop and testing procedures.

21A-51. The Manufacture of Sheet-Metal Combustion Equipment for Jet-Propelled Aircraft. L. H. Park. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1935-1946.

21A-52. Trucks for the West. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 90-93.

Manufacture of Peterbilt truck tractor cabs.

21A-53. Forty Years of Filtration. W. H. Oliver. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 94-97.

Manufacture of different types of filters for various industrial operations.

21A-54. Cost Saving Ideas. *Iron Age*, v. 164, Oct. 6, 1949, p. 95-98.

Series of practical cost-saving ideas for the metalworking industry.

21A-55. Design of Fixture Elements: Rests, Stops and Locators. Hans W. Smith. *Tool Engineer*, v. 23, Oct. 1949, p. 20-22.

Fixtures for drilling, milling, forming, welding, and gaging. Their principles are explained by describing their elementary parts.

21A-56. Saunders-Roe Princess. Wilfred E. Goff. *Aircraft Production*, v. 11, Oct. 1949, p. 343-351.

Third of series on manufacture of British "flying boat" includes assembly of the pressure-hull; alignment of mainplane-attachment points; attachment of shell-plating; and riveting.

21A-57. (Book) **How To Cut Production Costs.** H. E. Blank, Jr., editor. 371 pages. 1949. Funk & Wagnalls Co., 153 E. 24th St., New York 10, N. Y. $4.50.

Divided into three sections: Modern Production Methods; Production Techniques and Equipment; and Plant Maintenance, Services, and Working Conditions. Techniques for reducing costs in plants, materials controls, quality and inspection, fabrication, processing, and research. Check charts reveal strong and weak points in existing plant operations.

21B—Ferrous

21B-55. Muncie's Iron Lung. D. I. Brown. *Iron Age*, v. 164, Sept. 22, 1949, p. 79-81.

Two 50-gal. drums welded together, a vacuum cleaner and an inventive metal-plant executive helped meet Muncie's polio emergency by improvising a workable iron lung in 10 hr. The welding, cutting, drilling, and fastening that went into making this iron lung.

21B-56. Canning Processes. Frank H. Slade. *Mechanical Handling*, v. 36, Sept. 1949, p. 540-547.

The various steps in production of tin cans, from the ore to the steel plate, the tinning operation, and fabrication of the cans.

21B-57. How To Control Dimensions in Liquid Nitrogen Shrink-Fitting. Gilbert P. Muir. *Tool Engineer*, v. 23, Sept. 1949, p. 21.

Some difficulty was encountered in obtaining proper fit between a compressor cylinder and a Ni-Resist liner. Tests indicate that optimum results are obtained when the centrifugally cast, rough-machined liners are pre-cold treated in liquid nitrogen, followed by machining to the desired o.d.

21B-58. How Ford Manufactures Stainless Headlamp Rims. Frank W. Gawrinski. *Iron Age*, v. 164, Sept. 29, 1949, p. 62-64.

Welding, flash trimming, forming, spinning, and polishing in a high-speed, mechanized series of operations.

21B-59. High Duty Applications of Acid-Resisting Silicon Iron. R. V. Riley. *Metallurgia*, v. 40, Aug. 1949, p. 185-188.

Manufacture of silicon-iron heater tubes designed to carry live steam at about 100 psi. while immersed in dilute sulfuric acid.

21B-60. Nickel-Clad Steel: Some Notes on Its Production, Fabrication and Applications. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1894-1896.

Fabrication by welding, followed by rolling. A few applications.

21B-61. The Manufacture of Metal Containers; Some Aspects of Production Procedure. (Concluded.) *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1903-1910.

Deals with manufacture of lids, joining the ends of the body, attachment of ends, labor problems and time study, factory layout, varnishing, soldering, making-up, testing soldered joints, flanging, seaming, testing, production of can ends, lubrication of presses and lining.

21B-62. Precision Cutters for Finished Lumber. Paul Graham. *Western Machinery and Steel World*, v. 40, Sept. 1949, p. 82-85.

Manufacture of the above at Henry Disston & Sons, Inc.

21B-63. Fabricating the Parts for the Hotpoint Range. B. E. Schroeder and M. E. Maurer. *Finish*, v. 6, Oct. 1949, p. H21-H26.

Procedures involved.

21B-64. Metals for High Duty. R. W. Bailey. *Engineering*, v. 168, Sept. 9, 1949, p. 265-266.

Some aspects of the development and use of metals which have characterized engineering progress.

21B-65. Forged Axles and Locomotive Forgings. American Iron and Steel Institute, Steel Products Manual, Sec. 22, July 1949, 43 pages.

Manufacturing practices and handling methods.

21B-66. Carbon Steel Structural Sections. American Iron and Steel Institute, Steel Products Manual, Sec. 4, Aug. 1949, 93 pages.

Manufacturing practices, quality requirements, chemical requirements, and handling methods. Includes standard practice tables, simplified practice recommendations, and standard specifications.

21B-67. Hot Rolled Carbon Steel Strip. American Iron and Steel Institute, Steel Products Manual, Sec. 12, Aug. 1949, 73 pages.

Metallurgical aspects, manufacturing practices, quality requirements, chemical requirements, and handling methods.

21B-68. Wrought Steel Wheels. American Iron and Steel Institute, Steel Products Manual, Sec. 20, Aug. 1949, 104 pages.

Manufacturing practices, handling methods, design data, wheel technology, and wheel specifications.

21B-69. Modern Refrigerator Production. J. Reers. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2155-2160.

This issue deals with factory equipment and layout, cabinet-shell production, material handling, and press operations on components. Forming and welding are emphasized. (To be continued.)

21B-70. (Book) **Steel Electrical Raceways.** 130 pages. 1949. Electrical Distribution Systems Committee, American Iron and Steel Institute, 350 Fifth Ave., New York. $1.00.

A reference source on rigid steel conduit and electrical metallic tubing for installers, inspectors, designers, and engineers. Contains basic dimensional data, NE code tables for conduit wiring installations, and practical suggestions for handling and installation of conduit materials.

21C—Nonferrous

21C-7. A Dive Into Duck Season. Pat Jarman. *Steelways*, v. 5, Sept. 1949, p. 18-19.

Manufacture of lead shot in the shot tower. Finishing operations.

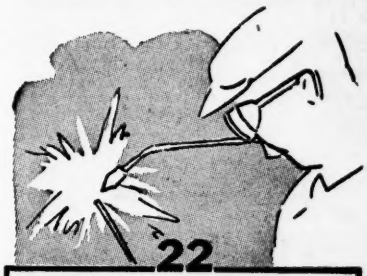
21D—Light Metals

21D-15. Rolled Aluminum From Bauxite to Finished Sheet. Marcia Lee. *United Effort*, v. 29, July-Aug. 1949, p. 5-9.

Fabrication of the above in various plants of the Permanente Products Co.

21D-16. The Brabazon Prototype: A Survey of Some of the Fabrication and Assembly Methods in Use on the World's Largest Aircraft. (Continued.) A. W. Morgan. *Sheet Metal Industries*, v. 26, Oct. 1949, p. 2161-2166.

Production of the internal-wing structure. (To be continued.)



JOINING and FLAME CUTTING

22A—General

22A-215. Light Weight Welded Structures—a Challenge to Naval Architects in Ship Design. Samuel Weening. *Journal of the American Society of Naval Engineers*, v. 61, Aug. 1949, p. 555-574.

General discussion and specific problems involved in developing improved designs and methods. 18 ref.

22A-216. Metallizing of Packing Areas. J. E. Wakefield. *Welding Journal*, v. 28, Sept. 1949, p. 875-876.

Procedures for rebuilding worn packing areas on pump shafts, sleeves, rams, plunger, turbine shafts, and other parts.

22A-217. Electrode Coatings Containing Rutile. R. D. Van Zante, T. R. Graham, and R. G. Knickerbocker. *Welding Journal*, v. 28, Sept. 1949, p. 439s-444s.

Progress of an investigation of the Federal Bureau of Mines concerned with the usability of rutile concentrates made from the titania ores of the Magnet Cove district in Arkansas in coating arc welding electrodes. Comparisons were made of electrode performance and mechanical properties of experimentally prepared welding rods using various rutile products for coating.

22A-218. Welding Dissimilar Metals. *Steel*, v. 125, Sept. 26, 1949, p. 72-74, 76.

Problems encountered and their possible solution.

22A-219. Tools, Jigs, and Fixtures for Resistance Welding. R. T. Gillette. *Tool Engineer*, v. 23, Sept. 1949, p. 22-25.

Typical examples.

22A-220. A New Bonding Resin. Detailed Results of Laboratory Tests on "Araldite". M. Ros. *Sheet Metal Industries*, v. 26, Sept. 1949, p. 1967-1984, 1986, 1988.

Mechanical strength and deformation properties of single-lap, double-lap, and butt joints made with Araldite resin on four light alloys, three steels, copper, brass, and phosphor bronze. Effects of immersion of Araldite light-alloy joints in different liquids.

22A-221. Resistance Welding in Industry. W. Koch. *Brown Boveri Review*, v. 36, May-June 1949, p. 201-212.

Equipment, procedures, and applications.

22A-222. How To Bronze-Weld. *Linde Tips*, v. 28, Oct. 1949, p. 77-80.

22A-223. Welding Development in the Royal Dockyards and Shipyards Since 1939. R. Anscomb. *Transactions of the Institute of Welding*, v. 12, Aug. 1949, p. 81-87.

Factors influencing the growth of ship welding and some of the obstacles to further expansion, especially in connection with training of welding engineers, limitations of costs, development of argon arc welding plant, and use of radiography.

22A-224. Tools for Welding. T. B. Jefferson. *Welding Engineer*, v. 34, Oct. 1949, p. 33-42.

Electrode holders, helmets, goggles, cables, connectors, ground clamps, regulators, brushes, clipping hammers, grinding wheels, and others.

22A-225. Dies Can Be Precision Welded. Walter A. Knocke. *Welding Engineer*, v. 34, Oct. 1949, p. 60-62, 72-73.

22A-226. 21 Ways to Lower Arcwelding Costs. Robert Wilson. *Iron Age*, v. 164, Oct. 6, 1949, p. 105-110.

Comprehensive appraisal of 21 specific possibilities, from the standpoint of design, production, and procedure.

22A-227. New Resins Provide Practical Bonding Agents for Metals. E. Preiswerk, K. Meyerhans, and E. Denz. *Materials & Methods*, v. 30, Oct. 1949, p. 64-66.

How durable, high-strength bonds joining metals, nonmetals, and their combinations are made possible by use of ethoxyline resins called "Araldites".

22A-228. Developments in Metallizing for Volume Output of Parts. John E. Wakefield. *Production Engineering & Management*, v. 24, Oct. 1949, p. 63-67.

Advantages and applications.

22A-229. Instruments for Studying the Welding Arc. L. P. Winsor, L. M. Schetky, and R. A. Wyant. *Electrical Engineering*, v. 68, Oct. 1949, p. 873.

Instruments used to study the welding arc over a wide range of arc current and voltage, and for a variety of electrode coatings. Preliminary results indicate that the instrumentation is capable of distinguishing between different types of electrodes and different test conditions.

22A-230. Can You Use Resistance Welding To Cut Costs, Increase Production? *Machine and Tool Blue Book*, v. 45, Oct. 1949, p. 101-104.

How it can be done in typical cases.

22A-231. Aluminum-Vinyl "Cold Solder" Has Interesting Possibilities for Industry. Edwin Laird Cady. *Materials & Methods*, v. 30, Oct. 1949, p. 77-79.

Putty-like filler pastes composed of Al-powder and vinyl resin have many potential uses as a repair material for metals

22A-232. Circuit Analysis of Frequency-Changer Welders. W. K. Boice. *Welding Journal*, v. 28, Oct. 1949, p. 946-956.

Analysis of the principal electrical characteristics of the main power circuits. Electrical advantages.

22A-233. Lowering Cost of Welded Construction. Omer Blodgett. *Welding Journal*, v. 28 Oct. 1949, p. 957-964.

How it can be accomplished by selection of larger electrodes, use of higher current, intermittent welding, and smaller size fillets. These savings can be further augmented by suitable bending, fitting, and cutting operations and by use of subassemblies.

22A-234. Jigging for Welding Cylinder Seams. *Welding Journal*, v. 28, Oct. 1949, p. 980.

Simple jigging method.

22A-235. The Statistical Part in Welding Investigations. B. B. Day. *Welding Journal* v. 28, Oct. 1949, p. 449s-461s.

Advantages to be obtained by use of the science of statistics in planning of investigations. Methods, with emphasis on the "factorial" method. 20 ref.

22A-236. Heat Effects in Anode Spots of High-Current Arcs. T. B. Jones, W. B. Kouwenhoven, and Merrill Skolnik. *Welding Journal*, v. 28, Oct. 1949, p. 461s-465s.

Proposed method for evaluating the rate of energy input to the anode surface. Correlation of melting rates with standard heat-flow equations may be possible.

22A-237. Electrical Resistance Offered to Nonuniform Current Flow. W. B. Kouwenhoven and W. T. Sackett, Jr. *Welding Journal*, v. 28, Oct. 1949, p. 466s-470s.

Results of a study of the phenomenon of spreading resistance and its contribution to the total resistance of contacts. They are of importance in resistance welding and in other applications such as electrical contacts and switches.

22A-238. Slope Control in Spot and Projection Welding. Ivar W. Johnson. *Welding Journal*, v. 28, Oct. 1949, p. 471s-476s.

Proper control of initial application of current facilitates projection welding of Al and reduces electrode pickup in spot welding Al and coated steels.

22A-239. (Book) **Welding and Cutting Manual.** 208 pages. 1949. Linde Air Products Co., 30 E. 42nd St., New York. $1.80.

Useful for reference and instruction for repairmen, farmers, garage mechanics, and maintenance men. Sections on use of oxy-acetylene equipment, methods of welding, cutting, heating, bending, brazing, and soldering, and numerous hints and shortcuts.

22B—Ferrous

22B-338. Operating Characteristics of Arc Welding Electrodes. F. W. Myers, Jr. *Steel*, v. 125, Sept. 19, 1949, p. 78-82, 84.

Tests on welding of steel with various types of electrodes. Weld-penetration characteristics indicate that the previously accepted theory of weld-metal penetration and depth of heat-affected zone increasing and decreasing together is basically incorrect.

22B-339. Box Beams Produced Economically by Welding. *Steel*, v. 125, Sept. 19, 1949, p. 101.

22B-340. Riveted Vs. Welded Ship Structure. E. M. MacCutcheon. *Journal of the American Society of Naval Engineers*, v. 61, Aug. 1949, p. 719-728; discussion, p. 728-736.

Previously abstracted from *Welding Journal*. See item 22B-69, 1949.

22B-341. Resistance Welding of Jet Engines. H. E. Lardge. *Journal of the American Society of Naval Engineers*, v. 61, Aug. 1949, p. 749-756.

Previously abstracted from *Welding Journal*. See item 22B-95, 1949.

22B-342. Welded Deck Girder Highway Bridge. Ned L. Ashton. *Welding Journal*, v. 28, Sept. 1949, p. 832-840.

Design and construction, which results in considerable savings.

22B-343. Double-Headed Fixture Welds Both Ends of Tank at Same Time. *Welding Journal*, v. 28, Sept. 1949, p. 840.

22B-344. Resistance Welding Stainless Steel Truck-Trailer Body Components. Byron Gates. *Welding Journal*, v. 28, Sept. 1949, p. 841-846.

Fabrication of roof, sides, floor, underframes, and doors. Assemblies are shipped in sets.

22B-345. Economic Electric Arc Welding. S. Oestreicher. *Welding Journal*, v. 28, Sept. 1949, p. 848-851.

Choice of suitable welding ma-

chines, electrodes, placement of apparatus and controls. Method of recording actual welding time.

22B-346. Welding Produces Forming Dies From Scrap Axles. *Welding Journal*, v. 28, Sept. 1949, p. 871-872.

Conversion of locomotive axles into large press dies for forming car parts at Union Pacific Omaha shops by means of forging hammer, flame cutting, and automatic submerged-arc welding.

22B-347. Welded Repair of a 52-Ton Cast Steel Press Base. Leslie C. Haynes and J. F. Sloan. *Welding Journal*, v. 28, Sept. 1949, p. 872-873.

22B-348. Arc-Welded Beam and Column Framing. *Welding Journal*, v. 28, Sept. 1949, p. 874-875.

Procedures for all-welded steel-frame building construction; design details.

22B-349. Spot Welding Galvanized Steel. M. L. Begeman, M. L. Hipple, and L. Cullum, Jr. *Welding Journal*, v. 28, Sept. 1949, p. 385s-395s.

Effect of welding current, timing, and pressure. Physical and metallurgical investigations as well as results of the use of a refrigerated coolant in electrodes. 17 ref.

22B-350. Welding in Locomotive Construction and Repair. F. Hargreaves. *Transactions of the Institute of Welding*, v. 12, Aug. 1949, p. 98-104.

Methods used by a British concern. Heat treatment after welding. Pioneer work on stereoscopic radiographs of welds.

22B-351. Induction Brazing Methods Applied to Permanent Magnets. D. Hadfield. *Metallurgia*, v. 40, July 1949, p. 165-166.

Difficulties previously encountered in the fabrication of permanent magnets, involving the use of the newer magnet materials, have been overcome by using the methods described. The process has made the high-energy anisotropic alloys suitable for a wide range of instrument uses.

22B-352. Submerged Melt Welding Stainless Clad. *Iron Age*, v. 164, Sept. 29, 1949, p. 69.

Bonding of stainless to carbon steel with automatic hidden-arc welding. Speed of welding is increased 11-15 in. per min.

22B-353. Problems of Welded Ship Design. J. F. Baker and F. B. Bull. *Engineers' Digest*, v. 10, Aug. 1949, p. 267-270.

A general discussion.

22B-354. Hard-Facing Improves Performance and Reduces Maintenance Costs of Ball Mill Shearing Machine Parts. Part III. *Steel*, v. 125, Oct. 3, 1949, p. 82.

Use of Stellite alloy.

22B-355. Large Welded Pipe Manufactured on New Low-Cost Equipment. *Steel*, v. 125, Oct. 3, 1949, p. 97.

Hydraulic press-forming and submerged arc welding steel plate into pipe now can be accomplished on a complete mill recently engineered and built by Yoder Co.

22B-356. Sprodbruchgefahr und Werkstoffprufung bei geschweissten Konstruktionen. (Testing of Materials and Tendency Towards Brittle Fracture in Welded Construction.) Erich Folkhard. *Schweisstechnik*, v. 3, June 1949, p. 61-66.

Causes of brittle fractures, means of avoiding them, and methods for eliminating unsuitable materials. (To be continued.)

22B-357. Zur Frage der Qualitätsüberwachung von Schweissungen; Le contrôle de la qualité des soudures. (Controlling the Quality of Welds.) W. Felix. *Zeitschrift für Schweisstechnik; Journal de la Soudure*, v. 39, Aug. 1949, p. 139-149; Sept. 1949, p. 167-175.

Extensive discussion on the basis of published information. Refers only to ferrous welded structures. Design factors. (To be continued.)

22B-358. Seam Welding Stainless Steel. *Welding Engineer*, v. 34, Oct. 1949, p. 65.

Data sheet of A.W.S. recommended practice.

22B-359. Projection Welding. R. K. Waldvogel. *Metal Progress*, v. 56, Oct. 1949, p. 510.

Joining cost decreased 80% in manufacture of small pressure vessels.

22B-360. Embossed Projections for Resistance Welding. *American Machinist*, v. 93, Oct. 6, 1949, p. 147.

Data sheet for selecting the proper contour and size of the above to be used for low-carbon steel.

22B-361. Doubled Production. *Industry and Welding*, v. 22, Oct. 1949, p. 38, 62-63.

Automatic weld fixture, consisting of a standard welding positioner mounted on an air piston which was designed and built at Gardner Denver Co. for fabricating steel pump liners.

22B-362. Welded 8½% Ni Steel for −300° F. Saves 50%. A. Grodner. *Industry and Welding*, v. 22, Oct. 1949, p. 40-42, 44, 64.

Design of pressure vessels for use at low temperatures and under pressure. Testing and welding procedure.

22B-363. Using Oxy-Acetylene for Straightening, Forming, and Cleaning Structural Steel. F. H. Dill. *Iron and Steel Engineer*, v. 26, Sept. 1949, p. 82-84.

Use to remove undesired distortion due to welding and to introduce desired distortion in steel parts.

22B-364. Automatic Submerged Arc Welding Increases Efficiency. F. W. Zilm. *Oil and Gas Journal*, v. 48, Oct. 6, 1949, p. 297, 299.

Equipment and applications. New developments and tests under consideration.

22B-365. How Metalizing Cuts Costs. John E. Wakefield. *Coal Age*, v. 54, Oct. 1949, p. 86-91.

Equipment for low-cost repair of worn parts. Surface preparation and metal characteristics. Metalizing limitations and finishing.

22B-366. Welded Locomotive Boilers. E. C. Poultney. *Engineer*, v. 188, Sept. 23, 1949, p. 332-335.

Development of manufacturing technique and specifications governing the welding process.

22B-367. Techniques of Quality Welding of Plain Carbon Steel Castings. E. LaGrelius and J. D. Wozny. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 543-552; discussion, p. 552-554.

Previously abstracted from *American Foundrymen's Association*, Preprint 48-8. See item 22b-137, 1948.

22B-368. Welding in the Wire Industry. John H. Corson. *Wire and Wire Products*, v. 24, Oct. 1949, p. 866-867, 870-872, 984-989.

Experimental work on flash-butt and pressure welding of 0.80 and 0.65% C hot rolled rod. After welding, the material was heat treated, wire drawn, and wrap tested. Welds were examined metallographically. Weld variables, including use of special atmospheres. It was found impossible, by either method, to produce welds of a high enough quality for finished wire.

22B-369. Brazing Tool Tips by Induction Heating. *Welding*, v. 17, Oct. 1949, p. 458-459.

22B-370. Factors Affecting Quality of Production Flash Welding. E. A. Sirabian. *Welding Journal*, v. 28, Oct. 1949, p. 925-931.

Joints, materials, equipment, and tooling used in fabrication of bicycles and accessory parts. Factors influencing quality of flash welds. 12 ref.

22B-371. Design of Welded Rigid Frame Subways. Martin P. Korn. *Welding Journal*, v. 28, Oct. 1949, p. 932-940.

Welded rigid frames for proposed new 250 subway track miles would save New York City $10,000,000. It is said that their fabrication can be geared to mass-production methods.

22B-372. Welding of Stainless Clad Steel. Perry C. Arnold. *Welding Journal*, v. 28, Oct. 1949, p. 940-945.

Problems encountered in the field erection of thin and heavy-gage stainless-clad steels and their solutions.

22B-373. How To Weld Sheet Steel. Part II. K. H. Koopman and F. J. Pilia. *Welding Journal*, v. 28, Oct. 1949, p. 976-977.

Requirements and techniques using the inert-gas-shielded arc process.

22B-374. Improved Knurl Drive for Resistance Seam Welders. R. K. Waldvogel. *Welding Journal*, v. 28, Oct. 1949, p. 978-979.

22B-375. Flash Welding Unequal Thicknesses. G. C. Farrington. *Welding Journal*, v. 28, Oct. 1949, p. 979-980.

High-production method for flash butt welding a 3-in. diam. pin to a ⅝-in. thick steel plate.

22B-376. Repair of Hoist Drum Is Tricky. P. A. Spaulding. *Welding Journal*, v. 28, Oct. 1949, p. 980-981.

Use of bronze welding for repair of cast-iron hoist drum.

22B-377. How To Repair a Cast Flange Section. H. B. Gilson. *Welding Journal*, v. 28, Oct. 1949, p. 981.

Welding sequence using bronze or fusion welding.

22B-378. Arc-Welded Beam and Column Framing. (Continued.) *Welding Journal*, v. 28, Oct. 1949, p. 982-983.

Structural details.

22B-379. Spot-Weld Consistency Studies. J. Heuschkel and H. Bitzer. *Welding Journal*, v. 28, Oct. 1949, p. 477s-483s.

Uniform, high-quality welds can be successfully produced by following a prewelding control procedure. This involves proper design, uniform material, proof-tested welding schedules, and tested equipment and controls. Report is confined to stainless and low-carbon steels. The same principles apply to other metals with detail variations.

22B-380. Spot Welding of Heavy-Gage Structural Steel. Ernest F. Nippes and Robert F. Underhill. *Welding Journal*, v. 28, Oct. 1949, p. 507s-520s.

Development of satisfactory procedures for spot welding of heavy-gage structural steel up to ½ in. in thickness. It is desirable to temper the spot in the heavier thicknesses.

22B-381. Flame-Cut Structural Silicon Steel Made Ductile. C. Earl Webb and F. H. Dill. *Engineering News-Record*, v. 143, Oct. 13, 1949, p. 38-39.

Test results which show that flame softening will make smooth flame-cut edges of structural silicon steel as ductile as machined edges. As a result, specifications may be modified to permit postheating to simplify and improve steel fabrication.

22C—Nonferrous

22C-26. Joining Wrought Nickel and High-Nickel Alloys. K. M. Spicer. *Welding Journal*, v. 28, Sept. 1949, p. 852-861.

Welding and brazing of Ni, monel, Inconel, "K" monel, "Z" nickel, and Inconel "X" by all applicable processes.

22C-27. Brazed Assembly. Lawrence Jacobsmeyer. *Metal Progress*, v. 56, Oct. 1949, p. 511.

Change of machined casting to copper brazed assembly saves 75% of cost.

22C-28. High-Frequency Brazing. G. E. C. Equipment for Tungsten Carbide Tips. *Automobile Engineer*, v. 39, Sept. 1949, p. 360.

Equipment of General Electric Co., Ltd., designed for brazing tungsten carbide tips.

22C-29. Copper Welding by the Carbon Arc Process. I. H. Child. *Welding*, v. 17, Oct. 1949, p. 455-457.

Principles, joint preparation, design points, and practical examples of use of the process in the electrical industry.

22D—Light Metals

22D-57. Shear Strength Consistency of Spot Welds in Alclad 24s-T3. J. C. Barrett. *Welding Journal*, v. 28, Sept. 1949, p. 821-831.

For each gage combination of Alclad 24S-T3 there is a shear strength level at which spot welds are most consistent. To obtain this high consistency, values of welding and forge force must be slightly above the threshold at which internal defects disappear. Experimental results.

22D-58. Electrical Problems in Argon-Shielded Arc Welding Thick Aluminum. R. D. Williams, P. L. Mirolo, and C. B. Voldrich. *Welding Journal*, v. 28, Sept. 1949, p. 445s-448s.

See abstract from *American Institute of Electrical Engineers*, "Electric Arc and Resistance Welding", item 22D-49, 1949.

22D-59. New Development Extends Use of Studwelding to Aluminum. J. Bland and V. A. Digiglio. *Materials & Methods*, v. 30, Sept. 1949, p. 78-80.

New end-welding method eliminates drilling and tapping operations. Many applications in industry are foreseen.

22D-60. Fundamentals in Manual Arc Welding Production Costs. D. M. Kerr. *Transactions of the Institute of Welding*, v. 12, Aug. 1949, p. 88-97.

Methods by which accurate costs may be assessed.

22D-61. Gas Welds in Aluminium-Magnesium Alloy Sheet. J. Pendleton. *Transactions of the Institute of Welding*, v. 12, Aug. 1949, p. 74r-84r.

Experiments to determine the cause and find a remedy for gas porosity in the base metal immediately adjoining the weld.

22D-62. Aluminum Watering Can. John A. Baier. *Welding Engineer*, v. 34, Oct. 1949, p. 70.

Spout and handle are joined to can body at low temperature, using an excess acetylene flame.

22D-63. Tinning Aluminum Sheathed Gables. W. E. Warner. *Railway Mechanical Engineer*, v. 123, Oct. 1949, p. 583.

22D-64. The Welding of Aluminium Alloys; Investigation of Associated Problems. W. I. Pumphrey. *Metallurgia*, v. 40, Sept. 1949, p. 239-245.

Investigations were designed to obtain information regarding factors which affect cracking during welding or casting, in order to permit ultimate formulation of a general theory of the occurrence of cracking, in castings and welds in Al alloys, and on the basis of this theory to suggest suitable methods for preventing or minimizing it, during welding. All welding was effected by means of the oxy-acetylene torch since underlying principles are believed to be the same for both gas and electrical welding. 16 ref.

22D-65. Furnace Brazing Successfully Used on Aluminum Assemblies. A. L. Goldsmith and C. E. Hickman. *Materials & Methods*, v. 20, Oct. 1949, p. 70-72.

By use of proper techniques and brazing alloys, difficulties of joining aluminum were overcome in fabricating refrigerator liners.

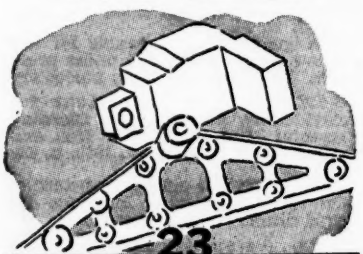
22D-66. Heliarc Welding of Aluminum Alloys. Francis H. Stevenson. *Welding Journal*, v. 28, Oct. 1949, p. 971-975.

Recommended procedures. Importance of this process in the metal-spinning industry where the weld metal must withstand the same cold working operation as the base metal.

22D-67. Das Temperaturfeld beim Schweissen eines Leichtmetallbleches der Gattung Al-Mg-Mn. (The Temperature Field in the Welding of Al-Mg-Mn Sheet Metals.) A. Müller-Busse. *Metall*, v. 3, Mar. 1949, p. 71-75.

Theoretical heat transfer on a sheet with a welding time of 30-40 sec. was determined from experimental data and the thermal-expansion coefficient. It was thus possible to draw conclusions on the resulting welding stresses.

For additional annotations indexed in other sections, see: 7D-73; 9-272; 12-190-198; 19B-185-187; 21B-69; 24B-43-44



23 APPLICATIONS

23A—General

23A-29. Choice of Materials Helps Achieve Remarkable Weight Reduction in ACF Talgo Train. T. C. Du Mond. *Materials & Methods*, v. 30, Sept. 1949, p. 57-60.

Materials selected for new train permitted designers to reduce weight by 75% over standard trains and lower center of gravity by 4 ft. Weight is reduced by the use of Al for all of the coaches, with the exception of the undercarriages; lightweight, high-strength steel castings for load-bearing members; and liberal use of aluminum-plywood sandwich materials.

23A-30. Materials at Work. *Materials & Methods*, v. 30, Sept. 1949, p. 68-69.

Bimetallic fishing-reel brake; steel tube cylinders for automotive shock absorbers; die-cast Al automobile door.

23A-31. Bearings. H. W. Greenwood. *Machinery Lloyd* (Overseas Edition), v. 21, Aug. 27, 1949, p. 103, 105.

Applications and advantages of powdered metals.

23A-32. Spools for Shipping Magnet Wire. F. A. Rappleyea. *Wire and Wire Products*, v. 24, Oct. 1949, p. 886-887, 890, 973-975.

Factors to be considered in choice of design and material. Data on properties of plywood, carbon steel, aluminum, magnesium, and fibreglass; also test results from winding and pull tests on seven different spool types (variation in design and materials).

23A-33. Materials at Work. *Materials & Methods*, v. 30, Oct. 1949, p. 80-82.

New applications include Al-Mg bottle carrier, Al oil cooler, brass-Al-stainless kerosene stove, glass-Kovar waveguide windows, and cemented-carbide quench blocks to assure correct tempering of razor-blade stock as well as to reduce scrap and the necessity of constant block renewal.

23B—Ferrous

23B-49. Construction Materials for High-Pressure Equipment. A. G. Harding. *Chemical Engineering*, v. 56, Sept. 1949, p. 116-117.

Equipment for the new Bureau of Mines coal-hydrogenation plant.

23B-50. Stainless Steel Moves Into Nitric Acid Container Business. *Chemical Engineering*, v. 56, Sept. 1949, p. 175.

New use.

23B-51. Steel in Shipbuilding. J. Lomas. *Engineers' Digest*, v. 10, Aug. 1949, p. 271-273.

Applications of various types.

23B-52. Tool Steels; The Development of New Types. H. Carr. *Iron and Steel*, v. 22, Sept. 1949, p. 413-416.

Object of this survey is to draw to the attention of toolsteel users some new types of steels and to suggest to toolsteel manufacturers possible fields of research. Includes sections on high speed steel, hot die steels, air-hardening cold work steels, graphitic steels, cold hobbing steels, glass-molding steels, and tungsten carbide.

23B-53. The Man Who Rebuilds People. *Steelways*, v. 5, Sept. 1949, p. 10-12.

Work of "surgeon-metallurgist" in replacing human bones with stainless steel.

23B-54. Graphitic Toolsteel. Edgar C. Wallace. *Metal Progress*, v. 56, Oct. 1949, p. 512.

Substitution for 18-4-1 high speed steel in the manufacture of lathe, sharpening, and grinding arbors.

23B-55. Increased Use of Hard Carbides for Wear Resistance. J. S. Gillespie. *Metal Progress*, v. 56, Oct. 1949, p. 523-526.

Use in connection with grinding equipment.

23B-56. The West Builds With Steel. *Western Metals*, v. 7, Sept. 1949, p. 27-29.

Steel construction by companies which do prefabrication and design work. Code requirements.

23B-57. General-Purpose Steel for Machining and Hobbing. *Modern Plastics*, v. 27, Oct. 1949, p. 105, 108-109.

Selection of steels for constructing molds, testing hobbing qualities, and specific uses.

23B-58. Plastic Product and Mold Design. John J. Johnescu. *Machinery*, v. 56, Oct. 1949, p. 182-189.

Part tolerances, mold steels, and principles of plastic-product design recommended by Westinghouse Electric Corp.

23C—Nonferrous

23C-59. How To Select and Use Non-Ferrous Metals and Alloys. Part I. J. W. Meier. *Canadian Metals and Metallurgical Industries*, v. 12, Aug. 1949, p. 8-11, 24-25, 35-36, 38.

Properties, processing methods, and applications. (To be continued.)

23C-60. Designing With Beryllium Copper Casting Alloys. John T. Richards. *Materials & Methods*, v. 30, Sept. 1949, p. 70-73.

See abstract from *Machine Design*, item 23C-53, 1949.

23C-61. Welded Monel and Inconel Pails. *Sheet Metal Worker*, v. 40, Sept. 1949, p. 48.

Advantages and design detail.

23C-62. Die Cast Assembly With Cold Worked Fastenings. *Die Castings*, v. 7, Oct. 1949, p. 25-26, 78-79.

Zinc and aluminum die castings used in a soap dispenser.

23C-63. Handled With Care. *Die Cast-*

ings, v. 7, Oct. 1949, p. 29, 78.

Zinc die castings used for mirror handles. Other possible applications.

23C-64. A Record of Progress. D. D. Cole. *Die Castings*, v. 7, Oct. 1949, p. 37-38, 83-85.

Zinc and aluminum die castings used in the new RCA 45-r.p.m. record player and RCA Victor changer.

23C-65. Economic Factors in the Use of Copper Base Die Castings. *Die Castings*, v. 7, Oct. 1949, p. 40-43, 74-75.

Typical castings and production considerations which lead to their use.

23C-66. Tin and Its Alloys. Bruce W. Gonser. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2147-2149.

Reviews literature since 1947 on supply and application. 44 ref.

23C-67. How To Select and Use Non-Ferrous Metals and Alloys. J. W. Meier. *Canadian Metals and Metallurgical Industries*, v. 12, Sept. 1949, p. 12-15.

Main alloy groups in relation to various industrial uses. 15 ref.

23C-68. Metals in Automobiles. Kempton H. Roll. *Automotive Industries*, v. 101, Oct. 15, 1949, p. 30-31, 105.

Breakdowns showing percentages of all metals and of nonferrous metals in the average automobile. Various applications of lead, which leads the nonferrous list with 1.37% of all metals and 33.2% of the nonferrous.

23D—Light Metals

23D-97. Ship-Building and Light Alloys. *Light Metals*, v. 12, July 1949, p. 404-409.

Summarizes and comments on papers presented at a recent symposium of the British Aluminium Development Assn. (To be concluded.)

23D-98. Woodworking Hobby Machine Tool Utilizes Aluminum. *Modern Metals*, v. 5, Sept. 1949, p. 22-23.

A combination lathe, circular saw, sabre saw, and a buffer-polisher-sander is fabricated from aluminum castings.

23D-99. Diesel Locomotives Gradually Switching to Aluminum. *Modern Metals*, v. 5, Sept. 1949, p. 28.

Horsepower ratings are kept high by supercharged or high speed diesel engines, and weight is reduced by use of aluminum.

23D-100. Engineering and Marine and Welding Exhibitions. *Light Metals*, v. 12, Sept. 1949, p. 475-503.

Applications of aluminum in varied industries.

23D-101. Welding, Shipbuilding, Mining. *Light Metals*, v. 12, Sept. 1949, p. 504-507.

An appraisal by the Aluminium Development Association of the present situation in the light of practice demonstrated at the Engineering and Marine and Welding Exhibitions and Scottish Industries Exhibitions.

23D-102. The Gresford Gages. R. M. Hay. *Light Metals*, v. 12, Sept. 1949, p. 517-521.

Use of aluminum in mine-shaft equipment. Design and construction of the first all-aluminum-alloy mine cages to be used in British mines, recently installed at Gresford Colliery.

23D-103. Scottish Industries. *Light Metals*, v. 12, Sept. 1949, p. 522-530.

Applications of aluminum demonstrated at the exhibition. Includes list of companies.

23D-104. Aluminium in Shipbuilding. E. C. Goldsworthy. *Engineers' Digest*, v. 10, Aug. 1949, p. 274-278.

23D-105. Aluminum Welded Crane. W. F. Walker. *Canadian Mining Journal*, v. 70, Sept. 1949, p. 83-84.

Welded overhead electric traveling crane, 15-ton capacity, 55-foot span, believed to be the first of its type, designed and fabricated from aluminum.

23D-106. Aluminum Age Opens New Era in Farm Irrigation. Roscoe Fleming. *What's New in Crops & Soils*, v. 2, Oct. 1949, p. 10-13, 23.

Expanding use of aluminum pipe sprinkling systems for irrigation.

23D-107. Cast Aluminum Panels Comprise Building's Exterior. *Foundry*, v. 77, Oct. 1949, p. 134.

Office building for Aluminum Co., Davenport, Iowa, makes use of sectional, cast aluminum panels for the exterior sheathing.

23D-108. Dial System Die Castings. F. K. Van Almelo and P. Rodney Sultzbach. *Die Castings*, v. 7, Oct. 1949, p. 21, 81-83.

Two aluminum die castings used by the Stromberg-Carlson Co. in automatic dial telephone equipment.

23D-109. Light Alloy Building. *Metal Industry*, v. 75, Sept. 23, 1949, p. 254.

Standardized interchangeable components and boltless construction in which connections are made by special sockets.

23D-110. Aluminum Alloys. E. D. Verink, Jr., and R. H. Brown. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2095-2097.

Developments in uses. 38 ref.

23D-111. Aluminum and Magnesium Castings. Walter Bonsack. *Canadian Metals and Metallurgical Industries*, v. 12, Sept. 1949, p. 20-23, 33, 35.

Choice of alloy, casting method, and heat treatment for desired properties.

23D-112. Use of Aluminum in the Petroleum Industry. Fred L. Plummer. *Petroleum Refiner*, v. 28, Oct. 1949, p. 97-106.

Use of aluminum in attacking high

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933 AND JULY 2, 1946 (39 U. S. C. 233)

OF Metals Review

PUBLISHED MONTHLY AT CLEVELAND, OHIO FOR OCTOBER 1, 1949

1.—The names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Editor, M. R. Hyslop, 7301 Euclid Ave., Cleveland; Managing Editor, M. R. Hyslop, 7301 Euclid Ave., Cleveland; Business Manager, W. H. Eisenman, 7301 Euclid Ave., Cleveland.

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W. H. Eisenman, Business Manager

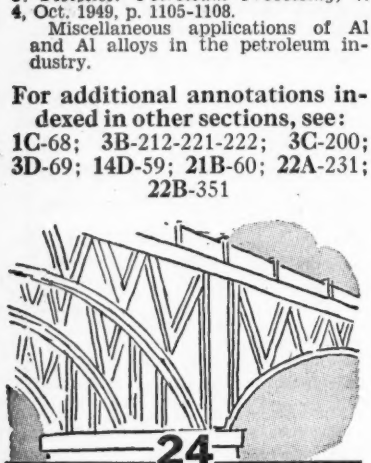
Sworn to and subscribed before me this 1st day of October, 1949. (Seal) Genevieve G. Fitzgerald, Notary Public. (My commission expires March 26, 1952.)

costs resulting from corrosion as well as its other advantages. 13 ref.

23D-113. New Uses for Aluminum. B. J. Fletcher. *Petroleum Processing*, v. 4, Oct. 1949, p. 1105-1108.

Miscellaneous applications of Al and Al alloys in the petroleum industry.

For additional annotations indexed in other sections, see:
1C-68; 3B-212-221-222; 3C-200; 3D-69; 14D-59; 21B-60; 22A-231; 22B-351



24A—General

24A-135. The Treatment and Properties of Springs. B. Coates. *Wire Industry*, v. 16, Aug. 1949, p. 645-647, 649; discussion, p. 649-651.

Previously abstracted from *Journal of the Birmingham Metallurgical Society*. See item 24A-92, 1949.

24A-136. Theory and Tests on the Plastic Stability of Plates and Shells. P. P. Bijlaard. *Journal of the Aeronautical Sciences*, v. 16, Sept. 1949, p. 529-541.

Assuming that plastic deformation is governed only by the amount of elastic shearing energy at the point in question, it is shown that the assumption of "plastic deformation" leads to smaller buckling stresses than that of "plastic flow". Using the assumption of "plastic deformation", it is found that the theory is in good agreement with tests by Kollbrunner and by NACA. Compares theory with those of Ilyushin, Stowell, and Handelman and Prager. 46 ref.

24A-137. Design of Prestressed Shells for Pressure Vessels. R. R. Maccary and R. F. Fey. *Chemical Engineering*, v. 56, Sept. 1949, p. 105-107, 111.

Second of three articles presents calculation method, graphs, and diagrams.

24A-138. Direct Method of Design and Stress Analysis of Rotating Disks With Temperature Gradient. S. S. Manson. *National Advisory Committee for Aeronautics*, Technical Note 1957, Oct. 1949, Washington, 31 pages.

A method is presented for determination of contour of disks, typified by those of aircraft gas turbines, to incorporate arbitrary elastic-stress distributions resulting from either centrifugal or combined centrifugal and thermal effects. Octahedral shear stress is used as the design criterion.

24A-139. The Behaviour of Continuous Stanchions. J. F. Baker, M. R. Horne, and J. W. Roderick. *Proceedings of the Royal Society*, ser. A, v. 198, Sept. 7, 1949, p. 493-509.

Tests on small-scale steel beams of rectangular and I-beam section subjected to load arrangements encountered in building structures. A theoretical explanation of the results is sought by reference to the simple plastic theory in which it is assumed that sections plane before bending remain plane after bending. The theory of members subjected to combined bending and axial load in the partially plastic range is developed, and applied to the case of single curvature beams. The growth of the plastic zones is traced and satisfactory agreement obtained between theoretical and observed collapse load. An improved theory is applied to double-curvature bending.

24A-140. Graphical Analysis of Impact of Bars Above the Elastic Range. K. J. DeJuhasz. *Engineering Experiment Station, Pennsylvania State College*, Bulletin No. 60, 1949, 64 pages. Reprinted from *Journal of the Franklin Institute*, v. 248, July 1949, p. 15-48; Aug. 1949, p. 113-142.

Previously abstracted from original. See item 3A-184, 1949.

24A-141. (Book) **Structural Design in Metals.** Clifford D. Williams and Ernest C. Harris. 596 pages. Ronald Press Co., 15 East 26th St., New York. $6.50.

Emphasis on the design of details rather than on the complete structure. An attempt is made to analyze both welded and riveted details in each phase of work. Six appendices contain standard specifications and codes.

24B—Ferrous

24B-42. A Study of the Behavior of Floorbeam Hangers. Static and Dynamic Stress Measurements on the Illinois Central Railroad Bridge at Galena, Ill. L. T. Wyly, M. B. Scott, L. B. McCammon, and C. W. Lindner. *American Railway Engineering Association, Bulletin*, v. 51, Sept.-Oct. 1949, p. 51-73.

Results of static and dynamic tests using SR-4 resistance gages. Stresses were measured at 11 sections of each hanger, 228 gages being used for the static tests and 64 for dynamic tests. Purpose of the tests was to investigate the effects of form of hanger section, and of floorbeam and stringer deflection upon stress distribution in the hanger.

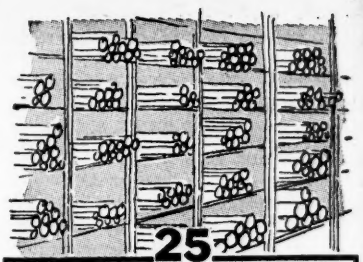
24B-43. Progress Report of Research Council on Riveted and Bolted Structural Joints. *American Railway Engineering Association, Bulletin*, v. 51, Sept.-Oct. 1949, p. 74-86.

The work is divided into 7 projects. Progress on effect of bearing pressure on static and fatigue strength of riveted joints; effect of rivet pattern on static strength of structural joints; fatigue strength of bolted structural joints; effect of grip upon fatigue strength of riveted and bolted joints; fatigue strength of high-strength steel riveted joints; and effect of rivet pattern on fatigue strength of structural joints. One project was inactive.

24B-44. Evolution of the Welded Box Car. L. E. Grant. *Welding Journal*, v. 28, Oct. 1949, p. 964-970.

Welding roof, ends, sides, and underframe.

For additional annotations indexed in other sections, see:
3D-67; 5A-56; 9-276-277-284-285; 14A-155; 19A-226-232-237; 19D-59; 20A-428-435; 22A-233; 22B-348-353-357-371-378; 23A-32; 23B-58



25A—General

25A-136. The Metal Situation. Joseph Zimmerman. *Proceedings Fifth Annual Meeting, Metal Powder Association*, 1949, p. 108-115.

Economic trends.

25A-137. L'organisation de la recherche sidérurgique en France et à l'étranger. (Organization of Metallurgical Research in France and Abroad.) G. Delbart. *Revue de Métallurgie*, v. 46, Apr. 1949, p. 237-254.

A short comparative review of metallurgical research facilities in France, the U.S., the U.S.S.R., Great Britain, Germany, Belgium, Italy, Czechoslovakia, Canada, Luxemburg, Sweden, India, Australia, Japan, Spain, and Switzerland. Data presented cover the period up to 1947.

25A-138. Production in High Vacuum. *Fortune*, v. 40, Sept. 1949, p. 121-124, 127-128, 130, 132.

Commercial processes utilizing high vacuum. Methods and apparatus. Among the diverse applications are metallizing of plastics, vacuum distillation, electromagnetic separation of uranium, vacuum impregnation of porous castings.

25A-139. The Adsorption of Long Chain Polar Compounds From Solution on Metal Surfaces. E. B. Greenhill. *Transactions of the Faraday Society*, v. 45, July 1949, p. 625-631.

Adsorption isotherms of the above on metal powder were determined. Saturation of the surface, giving a unimolecular layer, occurs at very low concentrations with strongly adsorbed substances such as stearic acid, whereas alcohols and esters require much higher concentrations. The adsorption process appears to be the same for thoroughly cleaned and reduced powders as for oxide-coated powders. Compares results and the boundary-lubricating properties of acids, alcohols, and esters.

25A-140. The Lubrication of Metal Surfaces by Mono- and Multi-Molecular Layers. E. B. Greenhill. *Transactions of the Faraday Society*, v. 45, July 1949, p. 631-635.

The boundary-lubricating properties of stearic acid, ethyl stearate, octadecyl alcohol, and the stearates of copper and silver. Layers of these compounds were deposited, by the Langmuir-Blodgett method, on a flat metal surface and friction between this surface and a clean slider of the same metal was measured. The minimum number of layers required to provide effective lubrication depends on the compound and metal used. Temperatures at which these deposited layers cease to lubricate were determined. 15 ref.

25A-141. (Book) **Elementary Metallurgy and Metallography.** Arthur M. Shrager. 297 pages. 1949. MacMillan Co., 60 Fifth Ave., New York, N. Y. $4.75.

Covers underlying principles and

(Turn to page 54)

Electrostatic Painting Combines Economy, Speed

Reported by Howard E. Boyer

Chief Metallurgist, American Bosch Corp.

Springfield Chapter A.S.M. opened the 1949-50 season on Sept. 19 with a dinner meeting. Prior to the main technical session, G. A. Chutter, dealer for the Ransburg Electro Coating Corp., showed a sound movie on the electrostatic painting process.

Mr. Chutter concluded a few remarks with the impressive statement that the electrostatic method of metal finishing combines the economy of the paint brush with the speed of the paint spray.

J. Walter Gulliksen, general superintendent of the Worcester Pressed Steel Co., then delivered the main technical lecture on the subject of "Metal Stampings". Details of Mr. Gulliksen's lecture and illustrative display of metal stampings are given on page 13. One of the most interesting examples in his exhibit was a set of specimens representing the steps in pressing an automobile engine crankcase from a flat sheet. Mr. Gulliksen also related some of his experiences in the newer field of impact extrusion.

FOR SALE

1—Surface Combustion Char-Mo Protective Atmosphere Generator. Capacity 600 CFH prepared gas. Single tube endothermic type with auxiliary preforming gas generator. Complete with Wheelco pyrometer, charcoal hopper, two gas scrubbers, gas booster, air blower equipped with 440 Volt, 3 phase, 60 cycle AC motors. Fired with low pressure gas burners. Excellent for clean-hardening protective atmosphere. Condition good. Eaton Mfg. Co., 739 E. 140th. St., Cleveland 10, Ohio.

J. W. Dice Co., formerly at Grand View-on-Hudson, N. Y., has moved its headquarters to 1 Engle St., Englewood, N. J. Expanded facilities will be available to help solve materials testing problems.

DRAW FURNACE—FOR SALE

SURFACE COMBUSTION CONTINUOUS SLOT CONVEYOR CONVECTION HEATER — 525° F. Max. — Eff. dim. 5' W — 10" H — 31' long, including washer unit. Cap. 2160 lbs. load/hr. Complete with L&N strip chart recorders. Address Box M-11 Metals Review.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

DISTRICT SALES REPRESENTATIVES: For Kansas, Utah, Iowa, Massachusetts and California. Experienced men with a need for additional line of high grade diamond wheel dressing tools. Excellent commissions. Send full details. National Diamond Laboratory, 108 Fulton St., New York 7.

DISTRICT SALES MANAGER: Pacific Northwest. Knowledge of electric welding. Willing to travel extensively in own car. Working with and educating distributors selling nationally known steel products for maintenance and repair of construction, mining, quarry equipment. Salary and commission. Write qualifications. Box 11-5.

SENIOR PHYSICAL METALLURGIST: For research on structure and properties of alloys. Ph.D. or equivalent. An atomic power project in western Pennsylvania. Box 11-100.

ENGINEER: With welding background covering all welding processes with emphasis on nonferrous. For atomic power project in western Pennsylvania. Not a production man, but one whose experience and interests are more in research. Box 11-105.

METALLURGIST: For manufacturing plant in Columbus, Ohio. Qualifications: Approximately 5 years industrial experience in metallurgical work; experience in heat treating and inspection of steel and steel parts; graduate metallurgist. Applicant should indicate starting salary and state when he can come to Columbus for an interview. Box 11-110.

POSITIONS WANTED

CHEMICAL ENGINEER: B. of Ch.E., 1946, desires metallurgical development or production position. Three years' experience in powder metallurgy including metallography, physical testing, quality control. Age 24. New York area preferred. Box 11-10.

METALLURGICAL ENGINEER: B.S., Carnegie Tech. Age 27, married, two children. Six years' experience — one at Mellon Institute, five with steel castings company, including 2½ years as plant metallurgist, 2½ years in customer service and specialty testing. Desires position in sales or production with opportunity for advancement. Cleveland or Pittsburgh areas preferred. Box 11-15.

METALLURGICAL ENGINEER: B.S. from Carnegie Institute of Technology, June 1949. Veteran, age 23, married, no children. Desires position as trainee in any phase of metallurgy. Eager to start at bottom to learn process thoroughly and contribute to its success. Pittsburgh area desired. Box 11-20.

MECHANICAL ENGINEER: M.Sc. Fifteen years' experience in design and development of heavy machinery with small mechanisms, diversified projects in mechanical engineering. Excellent background and professional aptitude test scores. Reference letters on successfully completed projects and patented designs. Ability to handle engineering problems and people. Foreign languages. Desires permanent position. Box 11-25.

METALLURGICAL ENGINEER: B.S. from Case Institute of Technology. Age 26, married, two sons. Two and one-half years' teaching mathematics, strength of materials and construction materials in technical trade school. Some sales, research and industrial experience. Willing to try anything with opportunity to train for future responsible position. Box 11-30.

METALLURGICAL ENGINEER: Desires administrative, sales or technical work, preferably in North, Northwest, or Southwest. Eight years' experience in steel (carbon, low-alloy, and austenitic-manganese) refining, casting, forging, welding, heat treating, testing and research. Experienced in metallography, spectrography and radiography. Age 30, married. Reasonable salary if in desired location. Box 11-35.

METALLURGIST: Age 24, married. B.S. from University of Notre Dame. Desires position in mill or development or both. Has had one year's diversified experience in physical metallurgy, heat treating, physical testing, and metallography. Some work on customer complaints and investigations. East preferred. Box 11-40.

SALES ENGINEER: B.S.Ch.E. Age 30, married; 8½ years' experience — four years in sales, 4½ years industrial, including production, process development, trouble shooting, analytical laboratory, physical testing, ferrous and nonferrous metals. Desires position in sales engineering with a progressive company offering opportunity for advancement. Will relocate. Box 11-45.

METALLURGICAL ENGINEER: M.S. Three years' experience in powder metallurgy development. Presently employed, but desires position with greater opportunity for advancement. Prefers metropolitan New York area. Age 29, married. Box 11-50.

METALLURGIST: B.S.Ch.E., Purdue University. Ten years' diversified experience in welding research, metallurgy, physical testing, heat treatment, and quality control. Some experience with high temperature alloys and aluminum. Steel mill experience. Desires position in development, industrial research or production. Prefer Northwest U.S. or Middle West. Married, age 32, three dependents, excellent health. Box 11-55.

METALLURGIST: Five years' experience in quality control and development in precision investment casting, nonferrous foundry, and aircraft manufacture. Solid background in metallurgical laboratory methods and inspection procedures. Training and some experience in X-ray diffraction. New York metropolitan area preferred. Box 11-60.

METALLURGIST: B. of Met. Eng., Nov. 26. Age 28, married. Primary interest in ferrous research or development. Will consider other position leading to such. Fourteen months of general experience in steel mill. Box 11-65.

METALLURGICAL ENGINEER: B.S. Age 27, married, two children. Desires position in production or development in South America. One and one-half years' experience in ferro-alloy production. Box 11-70.

METALLURGICAL ENGINEER: B. of Met. Eng. Age 31. Five years' experience in all phases of ferrous research. Specialized in casting development and alloy control. Superintendent of hard metal plant. Progressive, can cut costs and increase production. Desires position in production or development. Box 11-75.

METALLURGICAL ENGINEER: B.A. Sc., University of Toronto, 1949. Veteran, age 28, single. Desires position in research and development or production. Would like position in company with training program and opportunity for advancement. Willing to locate anywhere in U.S. or Canada. Available now. Box 11-80.

YOUNG METALLURGIST: M. MET. E. 1948. Desires position in production and development or research. Experience in service failure analysis, sales and nonferrous foundry work. Midwest preferred. Age 24, married, family. Box 11-85.

METALLURGICAL ENGINEER: Thorough background in engineering materials, metallurgy and chemistry; 17 years experience on production problems. Able to initiate research and development projects in ferrous and nonferrous field. Original work in high-temperature alloy field. Can assume position as technical director or technical assistant to operating or engineering group. Box 11-90.

MATURE METALLURGIST: With successful experience in management of research and development programs. Available after Jan. 1 for work of that nature, or for executive assistant in an organization where metal and materials are of prime importance; direction of quality control; sales engineering; or consultation for companies that cannot afford full-time experts in the above capacities. Box 11-95.

the techniques of modern metallurgy. Physics and chemistry of metals. Sources of metals and methods of extracting them; properties and uses of finished products; and methods of controlling and testing.

25A-142. (Book) **Conveyors and Related Equipment. Ed. 2.** Wilbur G. Hudson. 461 pages. 1949. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y.

Use and application of the various types of conveyors.

25A-143. (Book) **Allgemeine Metallurgie.** (General Metallurgy.) Max Hansen, editor. 295 pages. 1948. Office of Military Government for Germany. (FIAT Review of German Science, 1939-1946.)

Presented in eight sections by various authors. Sections are abstracted separately. Reviews German literature for 1939-46.

25A-144. Pacific Northwest—1960. Ivan Bloch. *Chemical Engineering,* v. 56, Sept. 1949, p. 108-111.

Predicts future production of a variety of heavy chemicals, metals, fertilizers, etc.

25A-145. The Metal Stockpiling Program. A. B. Quinton. *Metals,* v. 20, Sept. 1949, p. 10-12.

Policy and importance of stockpiling materials, only a few of which are available in the United States.

25A-146. Radioactive Tracers in Metallurgical Research. E. S. Kopecki. "Constructive Uses of Atomic Energy" (Harper and Bros.), 1949, p. 101-111.

Previously abstracted from *Iron Age.* (See item 25-131, 1947.)

25A-147. The Interrelation of the Engineering and Metallurgical Industries. Arthur P. M. Fleming. *Proceedings of the Institute of British Foundrymen,* v. 41, 1947-1948, p. B1-B7.

The steam turbine, rotor development, testing methods, jet-engine problems, noncorrodible steels, electric furnaces, arc welding, powder metallurgy, and atomic research and its application to metallurgy.

25A-148. Co-operative Research Activities. *Metallurgia,* v. 40, Sept. 1949, p. 257-272.

Presents brief report of research and development by British associations as follows: British Iron and Steel Research Assoc.; British Non-Ferrous Metals Research Assoc., W. L. Hall; British Cast Iron Research Assoc., J. G. Pearce; British Ceramic Research Assoc., A. E. Dodd; and British Welding Research Assoc., W. K. B. Marshall.

25A-149. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery,* v. 56, Oct. 1949, p. 162-174.

Information on a wide variety of alloys, solders, metal-working compounds, ceramics, plastics, coatings, oils, detergents and inhibitors.

25A-150. (Book) **Mines Register.** Vol. 23. Joseph Zimmerman, editor. 731 pages. Atlas Publishing Co., 425 W. 25th St., New York 1, N. Y.

Latest information on mining companies located in the western hemisphere that produce precious, semi-precious and base metals. A special section is devoted to a selective list of mining companies located in other parts of the world. Includes statistical tables.

25A-151. (Book) **Metallurgy for Engineers.** Ed. 2. E. C. Rollason. 339 pages, 1949. Edward Arnold & Co., London, 16s.

New and enlarged edition includes new developments and problems, such as heat resisting steels, brittle fracture, failure of welded ships, atomic structure of metals. Condensed description of metallurgical theory and practice for engineering students.

25B—Ferrous

25B-44. (Book) **Stainless Steels.** Carl A. Zapffe. 368 pages. 1949. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Reviews historical background and discusses corrosion resistance, metallurgical constitution, production, fabrication, and finishing. Includes chapters on martensitic, ferritic, and austenitic stainless steels. 316 ref.

25B-45. (Book) **The Yearly Proceedings of the Association of Iron and Steel Engineers.** 932 pages. 1949. Association of Iron and Steel Engineers, Empire Bldg., Pittsburgh 22, Pa.

All of the papers have already appeared in *Iron and Steel Engineer* and have been abstracted individually.

25B-46. (Book) **"Shock-Proof" Malleable Castings.** 92 pages. 1949. Lake City Malleable Co., 5000 Lakeside Ave., Cleveland.

An illustrated brochure on malleable iron castings made by this company. Design principles, properties, foundry and finishing procedures, applications.

25B-47. A Metallurgical Examination of a Cast-Iron Cannon Ball. J. E. Hurst and R. V. Riley. *Foundry Trade Journal,* v. 87, Sept. 1, 1949, p. 261-266.

Chemical composition, hardness, microstructure, and macrostructure of a 17th-century cannon ball.

25B-48. Pittsburgh Forgings Company—A Study in Progress. John C. McComb. *Steel Processing,* v. 35, Sept. 1949, p. 474-475.

Production and organization of this company. Steel yards, die shop, forge shops, power supply, production machining, heat treating department, inspection department, painting department, metallurgical department, maintenance, and assembly shop.

25B-49. High Strength, Low Alloy Steels. *Product Engineering,* v. 20, Oct. 1949, p. 89-95.

Composition, properties, forming characteristics, corrosion resistance, heat treatment, and applications.

25B-50. Iron, Mild Steels, and Low Alloy Steel. C. P. Larrabee and S. C. Snyder. *Industrial and Engineering Chemistry,* v. 41, Oct. 1949, p. 2122-2124.

Summarizes information published since 1947. 27 ref.

25B-51. Stainless Steels and Other Ferrous Alloys. M. H. Brown and W. B. DeLong. *Industrial and Engineering Chemistry,* v. 41, Oct. 1949, p. 2139-2146.

Reviews literature since 1947. Properties, structure, corrosion, and welding. 194 ref.

25B-52. Steel in the Competitive 50's. *Modern Industry,* v. 18, Oct. 15, 1949, p. 38-43.

Present trends and future prospects. How new processes, materials, and services affect the picture. The iron-ore and the steel-capacity problem. New processes, equipment, and applications.

25B-53. (Book) **The Ferrous Metal Industry in Germany.** G. Patchin and

Ernest Brewin. Published for British Intelligence Objective Subcommittee by H. M. Stationery Office, York House, Kingsway, London W. C. 2, England. 4s, 6d.

Condensed report of publications for the years 1939-1945.

25C—Nonferrous

25C-60. (Book) Copper and Its Alloys in Engineering and Technology. 88 pages. 1949. Copper Development Association, Kendals Hall, Radlett, Herts., England. Free of charge.

Describes in practical terms the various grades of copper; the alloys of copper and other metals; the brasses, bronzes and gun-metals; and their electrical, mechanical, and other properties. A series of tables classifies all these materials according to the type of service for which they are suitable.

25C-61. Thirty-Three Sources of Gold and Silver. David N. Skillings. *Skillings' Mining Review*, v. 38, Sept. 17, 1949, p. 1, 4.

Statistical data for 1948 production, plus brief description of major producers.

25C-62. Hafnium. Donald Ray Martin. *Foote Prints*, v. 21, no. 1, 1949, p. 8-12.

History, extraction, occurrence, reduction, physical properties, chemical properties, and applications. 45 ref.

25C-63. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2108-2114.

Reviews literature on the above since 1947. 114 ref.

25C-64. Lead and Its Alloys. G. O. Hiers. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2124-2125.

Reviews literature since 1947. 25 ref.

25C-65. Nickel and High-Nickel Alloys. W. Z. Friend. *Industrial and Engineering Chemistry*, v. 41, Oct. 1949, p. 2126-2132.

Reviews literature since 1947. Deals with alloys containing more than 40% Ni, or Ni plus Co. Developments, physical properties, and fabrication. 240 ref.

25C-66. The Technology of Copper-Lead Alloys. R. W. K. Honeycombe. *Transactions of the American Foundrymen's Society*, v. 56, 1948, p. 57-63; discussion, p. 64-65.

Previously abstracted from *Section of Tribophysics, Council for Scientific & Industrial Research, Commonwealth of Australia*, Physical Metallurgy Report No. 6. See item 4c-18, 1948.

25D—Light Metals

25D-32. (Book) The Technology of Aluminum and Its Light Alloys. Ed. 3. Alfred von Zeerleder. 450 pages. High Duty Alloys, Ltd., Slough, Bucks, England. (Translated from the German.) £1, 1s.

See abstract of German edition, item 27d-9, 1948.

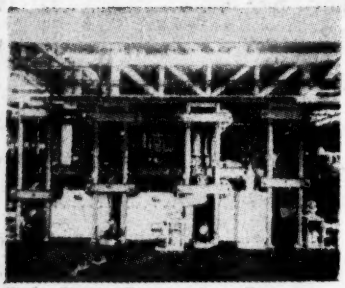
25D-33. Light Metals. *Chemical Engineering*, v. 56, Sept. 1949, p. 130-131.

Status and future prospects in the West.

ADVERTISERS INDEX

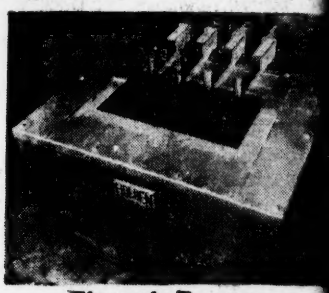
HOLDEN METALLURGICAL PRODUCTS

Salt Baths — Furnaces — Conveyors

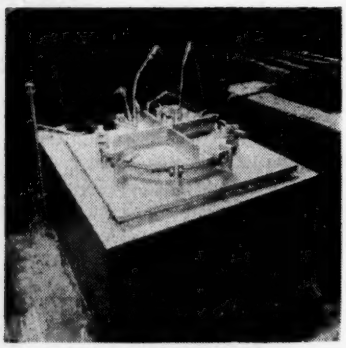


Salt Bath Processing Conveyor

Holden Liquid Electrode Furnace



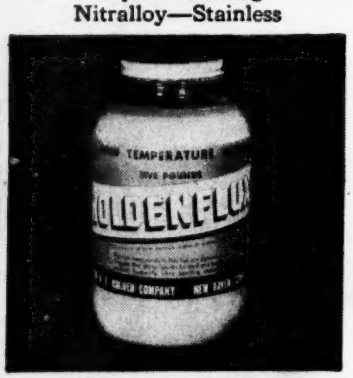
Electrode Furnace Ceramic or Steel Pot



Liquid Nitriding Nitralloy—Stainless

Prefabricated Ceramic Pot

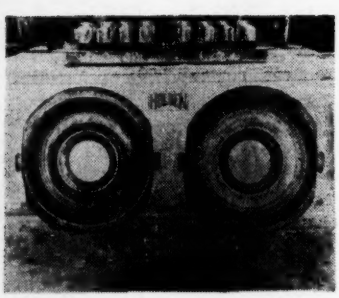
A new Holden alloy—to eliminate sludge



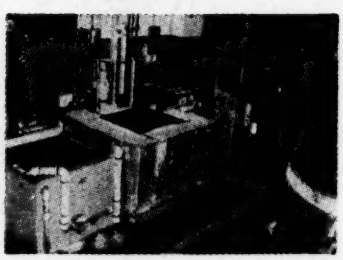
Water Soluble Flux

Soluble Oil can be reacted—waste used as a fuel

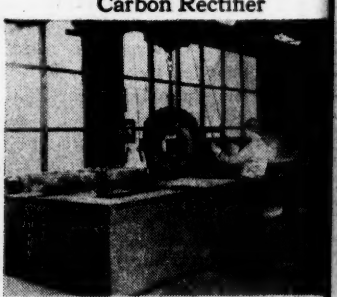
High Speed Salt Bath Carbon Rectifier



Before After



Marquenching Furnace



Cleaning and Descaling Furnace

Savings — There is more than one Holden Product that will reduce operating costs.

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